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EDITORIAL NOTES—GAS, &c.

A Big Advance in Efficiency.

In its efficiency and economic progress, incandescent gas lighting has scored many and material triumphs, which have been thorns in the sides of the competitors in artificial illumination. Increased efficiency is synonymous with increased economy; and in competition, the greater the economy that can be achieved for consumers, the greater, under such conditions as are enjoyed by the gas industry, the stability of the business generally. It has only been the electric flame arc lamp, with its limited opportunities for application, that honest electricians assert has had no equal in low cost light for light—in other words, cost per nominal, but not effective candle power—among the high-power incandescent gas lamps or systems. But the contention only got into proximity with truth when the electricity was supplied to the lamps at next-to-nothing, and capital charges were altogether disregarded. Furthermore, the highest efficiencies so far obtained with incandescent gas lighting have not been brought into comparison; only the results of such practicable systems for street lighting as have come prominently forward have been utilized. But we have to-day to ask consideration for a new and practicable high-pressure lamp giving an unprecedented efficiency. As in electric lighting of late, successes with incandescent gas lighting have been moving into view somewhat rapidly; and now there is this fresh triumph of persistent application. It is a development of the Keith high-pressure system; the central feature being a burner of remarkable power, whereby efficiency has been raised (using quite an ordinary gas as supplied in this country) to between 60 and 70 candles per cubic foot of gas consumed, and with the high-power gas of Scotland a still greater, but not proportionately greater, efficiency. In each lamp, only a single inverted mantle of small size is used. The new lamps are being made both for lighting large interior spaces and for outdoor purposes. At the one end of the range, we get a lamp giving 120 candles for 2 cubic feet of gas; at the other end a lamp giving, with the one inverted mantle, no less than 1500 candles by the use of only 25 cubic feet of quite ordinary gas.

These few particulars are given, in order to allow of two important matters being definitely impressed. The first is that the efficiency—60 to 70 candles—obtained per cubic foot of gas consumed is double that which was realized by the Keith lamps in the Dublin Exhibition grounds last June, and the illumination afforded by which was pronounced on all sides to be excellent. Therefore the consumption of gas to realize a light of 1500-candle power has been reduced by this step forward to one-half. A saving of 50 per cent. in gas is no small gain. Our electrical friends are fond of reducing their performances to very fine figures; and quite incidentally it may be pointed out that an efficiency of 60 candles per cubic foot of gas consumed is equal to 0·0166 (and an inexhaustible number of sixes beyond) cubic foot per candle power. A second point is that these lamps are made in units decreasing from 1500-candle power down to 120-candle power, without loss in efficiency. The flame arc lamp has not yet succeeded in splitting itself up into practical low units.

There are several points of scientific interest about the new burner, which will have to be thoroughly studied to see exactly wherein the inventors have made this successful upward move. Many advances have been made into the unknown by reproducible means, but means which do not always immediately divulge the precise causes of the successful transition from the lower to the higher place. The heating of the combustible mixture by specially devised means, the heating of the secondary air supply, and the supply of gas at a high pressure (all of which are described elsewhere), do not provide a sufficient scientific explanation of this hitherto unattained efficiency. We have had the gas and the primary air supply heated before by other means; but hitherto such an illuminating power per cubic foot has not been reached. We have seen the burner, have examined its every part, but the whole secret does not lie on the surface, as to why this considerable efficiency is procured by these particular means, and with a single mantle of diminished area. This last fact is also of importance—this reduction of the mantle area for an exceedingly high power. But whither is this all leading in the realizing of further economy for ordinary consumers? Is it to the general distribution of gas at higher pressures, with, if need be, the individual governing of gas-fires? Why should not in time the ordinary consumer enjoy, in common with the manufacturer and the public lighting authority, 60 candles for every cubic foot of gas he consumes? We merely ask the question, and leave it—knowing very good reasons why he cannot have it, at any rate for the time being. But, we repeat, What about the future?

The Importance of Small Things.

Too much importance cannot be attached to the paper that Mr. F. Paternoster read at the meeting last Friday of the Eastern Counties Gas Managers' Association, on "Retort-House Working for Small Works." This is the age of economy—an age in which every nerve is being strained in all manufactures to get the ultimate advantage from the capital and the raw material employed. But we are afraid that, in connection with gas manufacture, there are many small and medium-sized works where it is considered that the economies of production—as shown by the high makes realized per ton of coal—are the prerogatives of the larger works, and can only be viewed, admired, and coveted by the smaller makers from a distance, with little hope of possession. The contradiction to such a view is to be found in Mr. Paternoster's paper; and he proves that certain of the good things in gas manufacture that are open to the larger works by the advancement of knowledge are equally open to the smaller works, yielding to them economy, and the economy higher financial results. They are mostly little things—small, and not costly, refinements—that have produced the more modern advances in productive results under the ordinary systems of carbonizing, which advances are, by many among our managers of the smaller works, attributed to such changes as regenerative firing and machine working. These have, of course, big and important advantages in economical working; but we need only look to the upwards of 11,000 cubic feet of gas produced per ton of coal at Felixstowe last year, and to the 11,487 cubic feet produced during the past nine months, in direct-fired settings worked (until a few months ago) with shovel charging and now by a simple scoop machine, to see that in these small works, with the class of coal specified in the paper, the make of gas can be raised in amount to a point that can claim equal rank with some of the largest and most pretentious in equipment of gas-works. To put the matter shortly, Mr. Paternoster is now regularly extracting from his coal per ton an average of something like 1000 cubic feet more than he formerly did, and simply by bringing about refinements in his retort-house plant that, in the whole, have barely exceeded an outlay of £100. That is true engineering and management.

This considerable result from small things, as Mr. Thomas Glover admirably put it in the discussion on the paper, brings home to us the crudity of our retort-house arrangements in but the recent past; and, when we come to think about it, there is cause for surprised exclamation regarding the great loss there has been sustained in the past by imperfect knowledge of these things. Carbonization is still in the process of evolution; but these small improvements that have done so much make us almost stand abashed at the slowness of the evolution through the impeding little ruggedness to which we have been blind. Of what these consist is shown in the paper. There is nothing new about them, nor about the means of smoothing them down. But they are in the

paper collected together; and the collection gives them prominence, and holds up a directing finger to the managers of other small works—even those with direct-fired settings, who can do with all the economies that are possible under their limiting conditions. Mr. Paternoster has put in a retort-house governor, which enabled him to lighten the heavy seals that he formerly had. He also put in a tar-tower, levelled his hydraulic main, and cut his dip-pipes to an exact length. The important effects of all of these changes are well known, and do not call for enumeration here; but those managers of small works who want to learn more about them can pick them all out from the paper and the discussion that followed it. Mr. Paternoster gives less credit to his retort-house governor for his increased make of gas per ton than to the other improvements he made; but if he will consider the other improvements as the necessary auxiliaries to the most efficient work on the part of the retort-house governor, he will probably see fit to set the latter in the foremost position in attaining that for which he aimed. We will not enter into the relative merits of dip-pipes and anti-dips, nor into the question of heavier charges (so recently discussed), which were side-issues in the discussion. But importance may be attached to Mr. R. G. Shadbolt's alternative method of ensuring, in small works, the pull on the retorts being regulated according to the volume of gas being produced without installing a governor in the retort-house. His proposal is a simple water-loading arrangement in the exhauster-room, about which he did not enter into detail; but the automatic work of the governor in the retort-house, obtained without much expense, and introducing no complication in work, appeals, without further information of the alternative, as being preferable. However, Mr. Paternoster has realized what he sought; and what he has done, others in similar case may also do. There is no excuse, not even the excuse of expense, for not taking full advantage of improvement with such profit in its train.

The quality of the gas at Felixstowe is tested by the "Metropolitan" No. 2 burner; and its effect, in giving latitude in carbonization, was also referred to in the discussion. It cannot be denied that the new testing standard has given the gas manager a bigger scope in productive capacity. But what matters this? In it there are for the consumer compensating effects—financial, and in use beneficial. Increasing knowledge is broadening view. There has been talk of illuminating value and calorific power having something of a *pari passu* relationship, and of injury to consumers. The greater proportion of gas is now used for purposes in which there has to be considerable dilution of the gas by air; and the students of these matters are now telling us that greater heat efficiency can be obtained relatively, for the purposes for which gas is now employed, by comparatively poor gas. What has to be done by the maker is to produce gas that is best for the consumers of the major part of the gas; and latter-day investigation shows us that positive injury may be done to consumers by giving them gas so rich that, under the ordinary conditions of use, it cannot get air sufficient for its complete combustion. It is more difficult to get, with gas heavy in illuminating constituents, a proper admixture with air than is the case with a poorer gas; and therefore, while the consumer—whether using gas in an incandescent burner, for heating, or for motive power—is called upon to pay more for that gas, he loses in efficiency, and has greater cause of complaint through imperfect combustion. There are, of course, limits to this; but it is a matter that requires scientific investigation. In another article, there is announced an important advance in efficiency in connection with high-pressure gas lighting; but it will not be contended that between a 16 and a 20 to 21 candle gas tested by the "Metropolitan" No. 2 burner there is a proportionate increase in duty, under the conditions described, per cubic foot of gas consumed. The increase secured between the one and the other, in fact, is so small that the difference in illuminating power has nothing to justify it. But, in connection with this question, readers should study Professor Hopkinson's paper on the use of weak mixtures in gas-engines, read before the Institution of Mechanical Engineers, and the remarks of Mr. Emerson Dowson and Mr. James Atkinson in the discussion (*ante*, p. 157). There is confirmation of the point here made, and a refutation of the arguments of those who claim that there is a money value in the "Metropolitan" No. 2 burner which the consumers should definitely have. Why, science may yet show us that 14 or 15 candle gas tested by that burner is much more valuable to the incandescent burner, gas-stove, and engine-user than 14 or 15 candle gas tested by the "London" No. 1 argand, and is therefore, if anything, worth a higher price per 1000 cubic feet. This question of test-burner is one that bears upon the make of gas per ton of coal. Hence the reference here, and in the discussion of Mr. Paternoster's useful paper.

Edinburgh Moves for Lower Illuminating Power.

The continued worship of high illuminating power gas by our friends across the Border occasionally supplies subject-matter for reflection and comment. These high illuminating powers are a survival of a distant past, when local rich gas-yielding coals were available at moderate prices, and when the flat-flame burner was ubiquitous. Now the rich gas-yielding coals are at a higher price; and the incandescent gas-burner has come, and with (say) 20-candle Scotch gas will give, for about 2 cubic feet an hour consumed in an inverted gas-burner, more light than could be obtained before by the consumption of 10 cubic feet in flat-flame burners. The old reason for maintaining these excessively high candle powers has crumbled; and there is no ligament now existing that will keep it together. Nevertheless, wont sticks wondrously in Scotland, and to get illuminating powers running from 20 to over 30 candles, the gas suppliers, rather than produce an economy that should be writ large as most virtuous, persist in putting up their gas to the ancient level by the use of benzol and otherwise. Glasgow and certain Scotch towns have commenced to show the folly of this; and from Edinburgh, the gospel of lower illuminating power has been vigorously preached. Example, however, has not strong force across the Border—leastwise, in respect of this particular question; and the managements of gas undertakings have been slow to follow excellent leads.

Where Glasgow has not succeeded in exercising influence by example, it can hardly be expected that Edinburgh will do better. Nevertheless we regard it as a very distinct advance that the Edinburgh and Leith Gas Commissioners should now be promoting (as announced last week) a Provisional Order which, among other things, will bring down the standard illuminating power of their gas from 20 to 14 candles, tested by the "Metropolitan" No. 2 burner. Glasgow has now a 16-candle standard, and is distributing gas of rather above 18 candles. This move on the part of Edinburgh is big with importance; for after Mr. W. R. Herring's paper on "Illuminating Power and Lighting Efficiency" two years ago before the North British Association of Gas Managers, there can be little question but that, by gradual steps, the Edinburgh Commissioners intend to get down to the general supply of a gas complying with a 14-candle power standard, which will be sufficient for all purposes for which the modern and economical appliances are employed. Edinburgh, however, is not doing something that is unique for Scotland. We know of at least a couple of dozen Scotch gas undertakings with a 14-candle standard, but not tested by the "Metropolitan" No. 2 burner; and there is no present visible intention on their part of making use of their standard powers to drop from anything between 20 and 30 candle gas. Where the Edinburgh Commissioners will be doing something that is new for Scotland will be, if they get their Order through, in slipping—slowly perhaps, but surely—away from their old 20-candle power moorings to the more comfortable and sufficient 14-candle power quarters. The Commissioners are making a right and an enlightened move which will benefit both consumers and undertaking.

The Clashing of Technical Meetings.

For several years past, and more particularly since the historic exhibition in Paris in 1900, and the International Gas Congress in conjunction therewith, there have been, between the central gas organizations of Germany, France, and Great Britain, many evidences of goodwill, and of an increasing desire for personal association and for opportunities of participating in current technical interests. Organizations such as the German Association of Gas and Water Engineers, the Société Technique, and the Institution of Gas Engineers, only recognize geographical bounds in respect of membership; their technical work and friendship know no such bounds. The transfusion of the results of technical work and of friendly feeling indeed increases year by year. This being so, we make no apology for calling attention to the prevention of freer intercourse that ensues from the clashing or proximity of the dates of the annual meetings; and it would be an excellent thing if the Councils

of the three organizations could come to some mutual understanding by which this could be avoided in future.

The matter is brought the more prominently to notice this year, as our German friends are hoping to welcome some of their British colleagues at their annual meeting in Berlin. Representatives of the Council of the Institution will be going over to Berlin; and other members who would like to accompany them are (as will be seen by a notice in another column) invited to join the party. But it will be altogether impossible for them to do thing more than enter into the week-end part of the programme of events in Berlin. The German Association and the Institution are meeting the same week; and, without missing the technical proceedings, the party cannot leave London before the Thursday evening. The following week the Société Technique are holding their annual meeting in Paris; and it is just possible that some of the British visitors to Berlin will make the circular tour, and attend the French meeting before returning home. Last year it was not the German Association and the Institution who were holding their annual meetings the same week, but the former and the Société Technique; while the Institution assembled in Dublin the succeeding week. This crowding of the meetings of the representative organizations of the three countries into fourteen days was the cause of several personal disappointments in connection with the visit to Dublin, where, however, representatives of several countries were present, and opportunities were afforded for the exchange of courtesies. If arrangements could be made by which the three meetings were held in separate weeks, and, if possible, with an interval between them, so that too long an absence from home and work would not be necessary in the case of those who might desire to attend two or even the three meetings, we feel confident that this would inure to what we must all desire to foster—closer personal relationships between the technical officers of the gas undertakings of the three countries, and the evidence of *camaraderie* and interest in work that is not only afforded but attested by presence at gatherings.

The Committees of our home District Associations might also think over this matter, and consider whether they could not so arrange their meetings that they do not clash, and also so that they have intervals between them. Several gas engineers are members of two and three Associations; and at times, through meetings being synchronous or proximate, they have to make choice of the one of two they shall favour with their presence. This is a pity; and it certainly might be avoided by a little management.

Points of Policy as Reflected by Nuneaton.

The extraordinary meeting of the Nuneaton Gas Company, called on the requisition of a number of shareholders, to consider a resolution for the appointment of a Committee to inquire into the affairs and management of the undertaking generally, ended, as we fully anticipated it would do, in the rejection of the proposal. The resolution was lost on the voting of the shareholders at the meeting alone; and the proxy voting was heavily against it, and therefore in favour of the Directors and their Engineer and Manager. Personal influence was no doubt a strong factor behind the scenes before the meeting was held; and it is readily seen that there was for the Board a bigger stake at issue than any mere question of reduction of dividend, increase in the price of gas, low make comparatively speaking per ton of coal, and large leakage—all of which are subject in some degree to local conditions. The Directors were, as a matter of fact, standing on their defence even more than their Engineer and Manager; but we are not sure the choice they made of one of two possible attitudes towards the resolution was the best. Generally speaking, in connection with undertakings the working of which is essentially technical in character, we have not much faith in Committees of Inquiry composed of lay shareholders or shareholders whose independence is open rightly or wrongly to criticism. But nevertheless the acceptance of a proposition that a Committee should be appointed when, as here, discontent has admittedly been simmering for some time, would have conclusively shown that such an inquiry had no terrors for the Board or their Engineer; and a successful issue from the inquiry would have given a durable composure that cannot be looked for now. The attitude the Directors appear to have taken, looking to the report of an active campaign for support, is that any acceptance on their part of the proposition for a Committee of Inquiry would have been self-condemnatory of their past administration and policy. That is where, in the present instance (and such cases as these must always be separately judged), we think the Board were mistaken; and their personal opposition was really a sign of weakness rather than of strength.

There the matter, so far as its purely local and domestic aspects are concerned, may rest. Whether any good case was made out for an inquiry is a subject upon which there will be diverse judgment outside Nuneaton. For our own part, we consider it is a matter that entirely concerns the shareholders, and so may be dismissed. There are, however, arising out of the proceedings at Nuneaton, two matters of more general importance to the gas profession and the gas industry. The one is as to the extent to which the engineer and manager of a gas undertaking should be allowed to engage in outside professional work; and the other affects the personal interests of shareholders concerned in arousing agitation against the management of a concern. Far be it from us to deny that the officials of gas undertakings should not be permitted to undertake consulting work. We should be sorry to see the practice discontinued, as many engineers in charge of works have valuable personal knowledge and experience that it would be an incalculable loss at times to have to forfeit through their rigorous exclusion from participation in work other than that to which they are officially bound. But the outside work every intelligent man must agree should be subordinate to the duties and responsibilities of an official's regular employment; and if there is anything which shows that the outside engagements are encroaching upon the permanent employment to a degree that is incompatible with full, efficient, and diligent discharge of duties, to the injury of the undertaking paying for the services of such an official, then the terms of appointment should be revised on the earliest possible occasion. A Board of Directors may possibly enter into a loose agreement with an official; and because the official acts within the four corners of the agreement, it does not by any means follow that his so doing is in the best interests of the undertaking. And shareholders, who suspect that the liberty is not in the best interests of the concern in which they have invested their money, have a perfect right to ask that the Directors should inquire into the matter to see that they have not unconsciously made a latitudinal mistake.

Regarding the second point, there have been many broad insinuations of one among the prime-movers in this Nuneaton matter having been animated by motives, which, if true, would be of the most unworthy. An expert in gas affairs is undoubtedly better qualified than an ordinary shareholder to criticize the management of a gas undertaking; and we can recall instances where such criticism has had a good and rousing effect. But an expert in gas affairs, who is also associated with interests trading with a gas concern in which he holds shares (honest he may be, and quite above being animated by any personal animosity), is not, for obvious reasons, the best critic of the management of that undertaking. He is always in danger, on such an occasion, of having fastened to him, as has been indirectly done in the present case, some inspiring cause of action, from which malevolence is not altogether absent; and share-holding in other concerns by such a prime-mover may be looked upon with suspicion and as a standing menace. There is no reason why firms or their representatives trading with gas undertakings should not invest, and, by so doing, show their confidence in, the undertakings with which they have business relations; and, while we admit the right of every man to defend his investment, at the same time we do submit that such trading shareholders would be exercising a wise discretion in keeping themselves free from the charges of prejudice and motive of a character such as have been insinuated if not openly expressed (though as forcibly repudiated) in connection with Nuneaton. Mud of this particular nature is tenacious, and will stick. On this particular subject, Mr. George Helps has a letter in our "Correspondence" column, with parts of which (as will be seen from our remarks) we are in agreement, but from other parts we do totally and most emphatically dissent.

Visit to London of French Gas Engineers.

As a sequel to the forthcoming congress in Paris of the Société Technique du Gaz en France, some of the members will be visiting the Franco-British Exhibition at Shepherd's Bush. To-day, in another column, we give the provisional programme

of the congress, which extends from Tuesday, June 23, to Friday, June 26. On the Sunday following, a collective party (including ladies) of our French gas engineering friends will cross from Calais to Dover, and remain in London until Wednesday, July 1. It is hoped that at least forty will take part in this excursion, the main objective of which is, of course, the Gas Section of the "Entente Cordiale" Exhibition. It is not necessary here to refer to views, to which we have frequently and frankly given expression, as to the share of the burden of exhibiting which, as we think, should be borne either by one or other of the component parties forming the great gas industry. All we are now concerned with is to give every encouragement to all efforts that may, and we are sure will, be put forth to offer our friends and neighbours a cordial and hospitable welcome in keeping with the high esteem and regard in which they are, and have been for so long a time, held by us. The memories of the international fraternizing at the 1900 Exhibition in Paris are still pleasurably borne in mind. We know that throughout the gas community of France kindly reminiscences are yet preserved of the greeting and entertainment that the Brighton, London, and British Continental Gas Companies were enabled to offer to the French gas engineers who visited our shores after the Dieppe Congress in 1901. But few representatives of the Société Technique du Gas en France were able officially to inspect the Earl's Court Gas Exhibition of three years later, and still fewer the Dublin Exhibition of last year. None the less, these occasions were taken advantage of for giving expression to the feeling of sincere regard animating British gas engineers and managers for their co-workers in France. This year we are pleased to learn that, though cordiality cannot be measured by numbers, it is anticipated that a larger party of French visitors will be honouring London with their presence. Reference is made, in the circular elsewhere alluded to, to possible visits to various industrial works; and though the former mistake of an over-charged programme should be avoided (especially as the visit is for only three days), we trust that everything will be done to select suitable and sufficient show-places. A greeting—in some form or other—at Dover would be a gracious act, and be at once expressive of the cordiality and pleasure with which we are always ready to receive our esteemed colleagues of the Société Technique.

For the Relief of Posterity.

A peculiar situation has arisen in Buenos Ayres through the combination of two events, the effects of which could not a short time since have been foreseen. As our readers are aware who have followed the fortunes of the three Companies supplying gas in the city, an influential Electric Traction and Lighting Company of German origin a few years since established themselves in the city. Our Teutonic friends carried with them to Buenos Ayres the principle of the "time limit" applying to the granting of special trading concessions on the Continent. For certain valuable privileges and indulgencies, they consented to be limited to a life of fifty years, during which they are to provide the funds to wipe out their capital—the property then passing into the hands of the Municipality. Now there is a big difference between a company consenting to come under such an arrangement at the beginning of life, and one that has been in existence for a period, and have been conducting their business in the expectation of enjoying a perpetual tenure. That is the position of the Gas Companies operating in the city. The Municipality appear to have, or claim to have, some rights in the matter of price revision; and they have been exercising this circumstance and the terms of the concession of the German Electricity Company, to compel the three Gas Companies to fall into line, and have a life-limit imposed upon them, with the right to charge such price as will replace their capital expenditure in the period. The Companies have resented this; but the compelling power, it is pretty manifest, rests in the hands of the Municipality, and, unless the Municipality see the error of their proposal, their present wishes will be in the main obeyed. In the interests of the gas consumers of the present generation, such time-restricted concessions are not to be favoured. Fifty years is practically a lifetime; and, instead of the people whom the existing Municipality are elected to represent gaining anything by the arrangement, they will have to provide the funds, through the price paid for the commodity concerned, to wipe out the capital of the undertakings, and hand them over as a gift to posterity, who make no contribution towards providing these funds. Speaking at the meeting of the Primitiva Company on Tuesday last, Mr. H. E. Jones pointed out that the provision of an amortization fund for the Company during a period of fifty years would represent 1¼ per cent. per annum on the capital in addition to the amount required for dividend. We cannot see the justice of this additional tax on the present residents in Buenos Ayres. The system can be carried too far. The existing residents in the city have to pay more for electricity and for tram fares than they would have to do were it not for the necessity in the present to provide an amortization fund. They will in all probability have to pay more for gas for a like reason.

The Agitation against the Coal Mines (Eight Hours) Bill.

In our "Correspondence" columns, Sir George Livesey calls attention to the fact that the gas industry has not done its fair share in subscribing funds for prosecuting the war against the pernicious measure for curtailing the hours of adult labour in mines, which, if carried, cannot fail to have the effect of permanently adding to the cost of coal, and consequently to the price of gas. It cannot be expected that the economies produced in the gas manufacturing department will ever keep abreast of the uncontrollable (by the managements of gas undertakings) increases of expenditure produced by external causes. The slow-bleeding of industry that is going on now must in time produce an enervation that will be disastrous to the general well-being. Strong resistance against threatened additions to these costs is therefore most essential; and such an influential industry as that of gas supply should not be behind others in furnishing the wherewithal to wage war against the present serious condition of things. It will be seen that subscriptions (for the use of a Committee representing shipping, railway, gas, and other industries) should be sent to Mr. D. Milne Watson, the General Manager of the Gaslight and Company, Horseferry Road, S.W.; and Sir George earnestly hopes there will be a prompt response.

A Magistrate on Prepayment Meter Robberies.

The frequency with which cases of robbery from prepayment meters have been brought before him, have, Mr. Cluer (the Magistrate at Old Street Police Court) confessed a few days ago, led him to ponder over the matter. In this, he is not alone; for others who have an even closer connection with the trouble than that of sentencing offenders have also turned their attention towards the getting of a remedy. The prospect of finding a meter on unoccupied premises with a sum of money in the cash-box is doubtless a temptation to those who are on the look-out for an opportunity of laying hands on what does not belong to them; and the removal of the temptation at the earliest possible moment is desirable alike from the point of view of the revenue account of the gas undertaking and of the spiritual welfare of the depredator. The suggestion of Mr. Cluer to this end is that stamped post-cards, with instructions printed upon them, should be distributed among the consumers, with the request that, as soon as they decided to vacate premises in which a meter might be placed, they would post a card, in order that the company might, if they chose, remove the meter as soon as the need for it had ceased. Whether or not the idea, if put into practice, would be efficacious in bringing to an end any material part of the loss of cash and damage to meters to which gas suppliers are at present subjected in the case of empty houses, thanks are none the less due to the Magistrate for his suggestion—and, it should be remarked, they were immediately tendered on behalf of the Gaslight and Coke Company by Mr. Humphreys, who was prosecuting in the case which gave rise to it. The ruse adopted by this particular offender, of endeavouring to obtain from the house agent the key of the premises on the plea of wishing to view them as a possible tenant, shows that a good deal of method is employed in this class of theft. In this instance the culprit was suspected, inasmuch as at some houses to which he had already gained admission on a similar excuse robberies from meters had been discovered very soon after he had left; and the key was refused. But he subsequently obtained possession of it by another subterfuge. A surer way of the gas suppliers receiving prompt notice of forthcoming vacation of premises would appear to be by giving the consumers a direct pecuniary interest in furnishing it; and this, it seems, could be best secured by adopting

the plan that was mentioned by Mr. F. P. Tarratt, at the recent North of England Association meeting, as having proved satisfactory at Darlington—*i.e.*, giving a discount, so that on the clearing of the meter there would be some return to be made to the user.

Dangerous Gas Chandeliers.

References in presidential addresses in this country, and in papers in America and elsewhere, indicate the interest that has been aroused by the recent announcement as to what the South Metropolitan Gas Company have done, and are doing, in offering to convert, free of cost, to fixed pendants all water-slide chandeliers in use by consumers in their district. The Company evidently advise their consumers district by district of their willingness to do this; and the circular (to which a stamped perforated post-card is fixed) delivered to the consumer is in the following terms, after the boldly printed heading "Dangerous Chandeliers:"

Nearly all the explosions of gas occurring in dwelling-houses in South London have been caused by escapes from water-slide chandeliers. By using incandescent gas-burners, the need of this obsolete and dangerous appliance no longer exists, as the more powerful burner diffuses its light all over the room in which it is used. For some years past, the South Metropolitan Gas Company has actively discouraged the manufacture and use of water-slide fittings, and has induced many of its customers to consent to their conversion to fixed ones, which are safe, smart, and up-to-date. Hitherto a small charge has been made for doing this; but the Company is now prepared to carry out the work entirely free of cost. Consumers are strongly advised to take advantage of this offer; and, on return of the attached post card, they will be waited upon by an official of the Company, to take the necessary particulars and instructions. Should the condition of any water-slide chandelier render its alteration impossible, in such cases special facilities will be afforded for the substitution of a new fitting of artistic design.

The post card is worded so as to require only the filling in of the name and address of the sender.

Compulsory Arbitration in New South Wales.

The Act which was passed by the New South Wales Parliament introducing compulsory arbitration for a seven years' trial, is expiring among a good deal of labour unrest; and in the course of an interesting article on the subject the Australian correspondent of "The Times" remarks that at first sight the result seems to justify all the prophets who foretold failure. On looking further into the matter, however, it is to be noticed that the very party who originally fought the proposal "tooth and nail" is the one by whom the principle of the Act is now being confirmed and its provisions strengthened. The three "fundamental propositions" which have been laid down are: (1) Neither side, employers or employees, shall be allowed to dislocate industrial life by a lock-out or a strike. (2) No employer shall be allowed to carry on business in New South Wales if he will not pay his employees a fair wage. (3) Every dispute shall find a tribunal ready to settle it at once, without formalities and without appeal; and this tribunal shall have power to force both sides together, and power to force them to observe the award. It is pointed out that the Act was originally passed on the distinct understanding that it would prevent strikes; but it is still in force, and strikes and rumours of strikes abound. Yet the Bill that is to supplant it adopts and confirms its main principle, amid the applause of everybody, including those who sneered most at the first Act. He asks why this is; and answers the question with the statement that the failure of the 1901 Act, where there has been failure, is due to maladministration and deliberate attempts on the part of an unsympathetic Government to make it fail. If, the writer says, the Act had had a fair trial, many strikes that had taken place need not have happened; and that they did happen, in the circumstances "is no more an argument against compulsory arbitration than failure to give Sydney proper illumination from a plant built for a theatre would be an argument against electric lighting." While admitting there are many and serious objections to compulsory arbitration, he remarks that the people of New South Wales have made up their minds unmistakably that, whatever defects there may be in compulsion—it is "better than the old system of strikes." Evidently, therefore, it is necessary to wait until the new Act (with the altered provisions that experience suggests) has had a fair trial before judging finally of the success or otherwise of this endeavour to promote industrial peace.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 315.)

THE Stock Exchange has had a dull, quiet week; the American Market being about the sole exception to the general quiescence. There was the settlement of a long account to get through; and when this was over there was the closing on Friday to look forward to; so that business languished, and there seemed to be very little heart in it. Sellers were not met by buyers equally; and prices in general drooped. An occasional operation might make a splash; but it could not set up a counter-current. Bad weather at the opening made things flat; and with this the labour outlook flattened Home Rails. On Wednesday, there was a bit of a rally. But business was too quiet for it to have a strong influence; and the next day things were back again as they had been. Saturday, an isolated half-day, was poorly attended. The improved weather gave Rails a fillip; but Consols were again depressed by the influence of new issues and other causes. In the Money Market, there was a good demand for Stock Exchange and month-end purposes; but at the close the supply was superabundant. Discount rates eased steadily. In the Gas Market, business has been below the average on the whole; and the lion's share of it was in the big issue. There were few changes in quotation beyond *ex div.* adjustments. Some were up and some were down; but the general tendency looked satisfactory. In Gaslight and Coke issues, the ordinary was active and steady, with transactions which ranged within the limits of $94\frac{1}{2}$ and $95\frac{1}{4}$. The secured issues were quiet; the maximum marking 89 and 90, the preference from $107\frac{1}{4}$ to $108\frac{1}{2}$, and the debenture $84\frac{5}{8}$ and 85. South Metropolitan was a point easier; opening at 122, and marking $120\frac{1}{2}$ on Saturday. The debenture fetched 84. Commercials were neglected. In the Suburban and Provincial group, Alliance and Dublin of both issues had a fall. Brighton original changed hands at 200; South Suburban at 118; Wandsworth debenture at 78; West Ham preference at 120. The Continental Companies were very quiet. Imperial had a few transactions, ranging from 179 special to 181. European fully-paid was done at $23\frac{1}{2}$ and $23\frac{3}{4}$, ditto part-paid at $17\frac{1}{2}$. Union was not dealt in. Malta marked $4\frac{3}{8}$. Among the undertakings of the remoter world, Buenos Ayres changed hands at from $11\frac{11}{16}$ to $11\frac{7}{8}$, Primitiva preference at $4\frac{7}{8}$ and 5, ditto debenture at $94\frac{1}{4}$, River Plate at from $13\frac{5}{16}$ to $13\frac{1}{2}$, San Paulo at from $13\frac{5}{8}$ to $13\frac{23}{32}$, and Oriental at 141 and $141\frac{1}{2}$ *ex div.*

ELECTRICITY SUPPLY MEMORANDA.

"Crisis in Electric Lighting"—Brighton Councillors' Experiences in the Competition with Electricity and Modern Incandescent Gas Lighting—False Statements and Business Development—Experiences at Reading—What of the Future?

MANY shareholders in electric light companies must have been startled last Thursday by the announcement on the placard of the "Financial Times," "The Crisis in Electric Lighting." Many were no doubt tempted to buy the paper, and were partially relieved to discover that for which they searched was essentially an abstract of the paper on the effects of metallic filament lamps that Messrs. Handcock and Dykes recently read before the Institution of Electrical Engineers, and upon which comment was made in the "Memoranda" of last week. But all the same, there is unquestionably an expanding uneasiness that these lamps are going to make a serious inroad upon the volume of business, that there will be some difficulty in making up the loss, and that a capital expenditure will be required in the distribution department per installation greater in proportion to the revenue realized than has been the experience of the past. There is, as we pointed out last week, very grave consideration pending among electricity supply administrators as to whether, in view of the fresh conditions created by the lower consumption lamps, it will not be advisable to overthrow flat-rate charges and the maximum demand system, and adopt a fixed charge based on the maximum number of lamps used, with a fairly low charge per unit in addition. The majority of those who took part in the discussion on Messrs. Handcock and Dykes's paper were favourable to some such system being applied. As was seen last week, Brighton, the home of the maximum demand system, has discarded it as discredited by experience, and has gone in for flat-rates on somewhat higher terms than previously; the imperative necessity of the Electric Lighting Department being a larger revenue, which they cannot anticipate in face of the consumption reducing proclivities of the new lamps, which consumers are largely adopting for the purpose of effecting savings on their heavy lighting bills.

When the proposed new tariff was under consideration by the Corporation, there were several interesting speeches made, in which there were many statements by members of the Corporation regarding the competition of gas and electricity. These were not biassed statements; and they were made by members of a Corporation owning an electricity undertaking, which has had a free head in showing what electricity can do in such a popular seaside resort. One thing it has clearly shown has been that, with all the favouring, it can make adverse balances, and turn electricity consumers to revive their patronage of gas. In the speech of the Chairman of the Committee (Alderman Carden), he owned that,

through the unpopularity of the maximum demand system, the custom of more public-houses has been lost by them than in any other class of consumer. Big drapers, too, complain of the cost of their arc lamps. The Alderman also said there are erroneous views abroad as to the relative cost of gas and electric lighting; and he made some comparisons as to the price the Corporation were paying for "old" gas-lamps in the streets and for electric incandescents. About the "erroneous views," it is a great disadvantage to electricity that many electricity consumers have previously been consumers of gas under the incandescent system, and have knowledge of what they then paid and what they pay now. As to the "old" gas-lamps used in the streets, whose fault is that, when modern incandescent street lamps are on offer? As to the low prices quoted for electric street lamps, no one knows outside the Electricity Department how these prices are made up; and the Chairman was silent on the subject of the illuminating power of the lamps in comparison with modern incandescent gas-lamps of low consumption and high illuminating power. The ratepayers will notice that it is proposed to raise the price of electricity for street lighting, which is an indication that the low price charged is not a remunerative one. In view of Alderman Carden's statements, it is rather significant to find Alderman Blaker saying that the Electricity Department is "losing many customers by virtue of improved gas lighting." Fears were also expressed that the higher price for electricity would turn those electricity consumers who are wavering in decision over the comparative advantages of up-to-date incandescent gas-lamps and electricity lamps. Mr. Martin likewise advertised the fact that there has been great dissatisfaction among the users of the electric light, and that many have adopted gas on account of the charges—charges lower than the revised ones. He added that "he knew of consumers who said their expenses were considerably less with gas . . . and when they had a competitor like incandescent gas, they must compete with it in price." These are only examples of the testimony from members of the Brighton Corporation as to the dissatisfaction of electricity consumers with their costs. This testimony cannot be said to be the product of imagination, or the biassed assertions of gas advocates.

The dissemination of literature by electricity supply authorities, in which gas is maligned and credited with extremely virulent qualities, does not appear to make much impression on the annual accounts of the undertakings concerned. The activity in spreading this literature is great; the harvest is but small. One of the undertakings which circulated some of the baser of these statements was the Reading Electric Supply Company; and it has been interesting to keep an eye on their annual statements to ascertain the effect on the business of their libellous literature. Their last issued accounts suggest that their methods require revision; for the foolishness of trying to drive down people's throats what they know from experience to be false must also make them look dubiously upon the excellent character given to electricity by the circulators of the fabrications about gas. Instead of this literature having improved the financial position of the Reading Company, their financial position is really worse than it was twelve months since; but the Directors suavely state their belief "that the shareholders will regard the results as quite satisfactory." They may do so if they are blind to the facts as presented in the report and accounts. No interim dividend was paid last summer; and the dividend for the entire year is only 4 per cent., which is not good for a trading concern whose future is of a decidedly nebulous character. The capital expended on the concern is £167,060, and the issued capital is £147,425; so that the account has been overspent by £19,635. In view of the market position of the shares, the Directors would hardly deem it wise to make a new issue just now. Yet capital expenditure is going on at a far greater rate than the increase in revenue would seem to warrant. Then we find in the revenue account that the amount set aside for depreciation is only £2200, which is merely making provision at the rate of a little over 1¼ per cent. per annum on the capital. Again, the revenue for the past year was only £15,166; and the expenditure (including the £2200 depreciation) £9675. The gross profit was therefore only £5491; and £5594 is required to pay the small dividend of 4 per cent. The carry-forward a year ago was £429; it is this year £122 only. Coal and rates are accused of having made things look worse than they would otherwise have been. Where the shareholders can discover "satisfaction" in this state of affairs, we fail to see; and certainly they cannot find it in the decline of the market value of their shares. Looking back to 1903, when hopes ran high, the £5 shares were selling for £6 6s. 3d. apiece. We believe the shares can now be obtained for about £4 each. We know they were on offer by one firm not many months since at £4 10s., with an intimation that no doubt a lower figure would be favourably considered. Assuming, however, that the £4 10s. holds good, this is a fall of about 36¼ per cent. in five years. In the same period, Reading gas stock has advanced from £104 to £114 per cent.! No further comment is required.

About the future, business is not expanding at a rapid rate, notwithstanding the literature the seductive terms of which were so thin that the gas consumers had no difficulty in seeing through them. Expenses are increasing, and the average profit on the business done is not so good even as formerly. On top of this, the Directors point out, as though it is something over which the shareholders have cause to be jubilant, that "the new metallic filament lamps will enable consumers to largely increase their illumination, and at the same time *reduce their quarterly bills for electrical energy*." The lamps they also say are "already being used on an extensive scale; and they are bound to lead to a more general adoption of the electric light." They certainly are not "bound" to do so. There are various considerations in which consumers take an interest besides the quantity of electricity these lamps consume. They have to consider the cost of installation; of ripping out all their gas-fittings, and making good the damage. They have also to consider the cost of renewals, reliability of the light, and other points. From the shareholders' standpoint, there is the consideration that the capital cost of laying in each new service is not lessened by the metallic filament lamps; but the revenue is—it is reduced by the metallic filaments to practically one-third of what it would be if carbon filaments were used throughout. There is another point upon which we have recently made comment; it occurs again in this Reading report. The connections are stated to be equal now to 117,719 eight-candle power lamps, including a total of 1501-horse power of electric motors. Cannot even lay shareholders see the absurdity of reducing connections to the equivalent of 8-candle power lamps, and inflating the figures by converting 1501-horse power of motors, the electricity for which is supplied at a much lower price than 6d. per unit, to the basis of 8-candle lamps? Just now we saw that the metallic filament lamps are "being used on an extensive scale." This being so, they introduce a further absurdity into the reduction of connections to 8-candle power, in that a 32-candle power metallic filament only consumes one-third the electricity that four 8-candle carbon filament lamps will consume. These are considerations affecting the finances of the future; but we end as we began this criticism, by questioning the value in the efforts to develop an electric supply business of attempting to defame a competitor on grounds that consumers know from experience are false. Fair criticism by competitors we do not mind in business competition; nor do we object to make use of it ourselves.

A New Danger in Street Lighting.

In "Electric Supply Memoranda" there have been some references to the further complication that the magazine introduces into the flame arc lamp; and this it was feared would result in additional trouble and danger to the public by the collapse of the lights. A correspondent, with experience of magazine flame arcs, confirms this in the following communication: Now that the flame arc lamp is beginning to assert itself, with all its intricate mechanism, whether of the "Gilbert" or the "Oliver" type, it behoves local authorities, and more particularly the general public using the streets, to be prepared for a new danger—viz., that of a large area, depending upon these lamps, being plunged into darkness owing to their failure to "shoot" their carbons; for the drawbacks of these new lamps are the expense of the carbons and the short hours obtained. It is not difficult to obtain cheap "flame" carbons, but special lamps are needed to burn them; and the diameter of the carbons having to be kept very small, a "magazine" type of lamp is necessary to enable the contractors to get reasonable hours of lighting from the carbons. It is here that the trouble and danger come in. With a number of loose carbons (six pairs in the case of the "Gilbert" lamp), which require automatically feeding, dropping one by one into the burning position—causing considerable requirements, and more than are advisable in an arc lamp, which its sponsors admit are "already sufficiently complicated"—their liability to "jam" is constant; and as the flame arcs are placed in important positions in the traffic line, one can easily realize the danger that arises when the light fails owing to this "jamming," which takes place very frequently, leaving in darkness a larger area than should be lighted by any one lamp, until such times as the station hands can be apprised of the fact, and are able to turn out and remedy the defect. Surely, the streets of our great cities, more especially the Metropolis, with their enormous traffic should not be dependent for their lighting upon such unreliable lamps, fitted with the weak and uncertain electrical and mechanical parts which go to make up the ordinary flame arc, with its current-conducting flexibles, sliding carbon-holders, clockwork feeding-gear, guiding-rods, magnetic blows for the arc, and the other equally indispensable sensitive and complicated arrangements. Will it not be well to get back to lesser units of light and smaller areas, so as to make the margin of safety broader for the public lighting of our main roads? It is a very serious matter, when lamps are strung (say) about 160 feet apart, and at the junctions of important thoroughfares, affecting the lives and limbs of the community, that these large areas should be suddenly plunged into darkness through the failure of some small, but important, piece of mechanism.

German Association of Gas and Water Engineers.—It is announced that the 48th annual meeting of the Association will take place in Berlin from the 15th to the 19th prox. Visits to some well-known industrial works have been arranged for the afternoon of the 15th, and in the evening there will be a general assembly and reception. The technical proceedings will occupy the mornings of the three following days. The new gas-works at Tegel, belonging to the Municipality of Berlin, will be visited on the Tuesday afternoon. The last day (Friday) will be devoted to inspections of works and an excursion. A detailed programme of the proceedings will be issued later. The President of the Association is Herr J. Nolte, the General Manager of the New Gas Company of Berlin.

INSTITUTION OF GAS ENGINEERS.

Arrangements for the Forthcoming Annual Meeting.

We have received from Mr. Walter T. Dunn, the Secretary of the Institution of Gas Engineers, the following particulars in regard to the arrangements for the annual meeting in June: On Tuesday and Wednesday, the 16th and 17th, the members will assemble at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, Westminster; and on Thursday, the 18th, at the Franco-British Exhibition, to which there will be an official visit. In addition to the programme of papers, which is in course of arrangement, the President (Mr. W. Doig Gibb) will deliver his address at the commencement of the proceedings, and on the following morning a lecture will be delivered by Professor W. A. Bone, F.R.S., of the Leeds University, on "The Thermal Decomposition of Hydrocarbons and the Theory of Luminosity of Hydrocarbon Flames." In the evening, the President and Mrs. Gibb will give a reception at the Royal Institute of Painters in Water Colours. The Council have received and accepted a very kind invitation from the German Society of Gas and Water Engineers for the members to visit Berlin at the conclusion of the meeting, for an inspection of the new gas-works of the city, and especially the installation of vertical retorts. The party will leave London on the night of Thursday, June 18, returning from Berlin the next Tuesday morning. Full particulars will be announced to the members as soon as the arrangements are complete, which it is expected will be during the present week. For those who do not wish to go to Berlin, there will be an excursion to Brighton on Friday, the 19th of June.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

Annual Congress.

Under date of the 30th ult., the President, M. Andre Coze, has issued the announcements and provisional programme of this year's meeting of the French Gas Society. It will be held, as previously announced, in Paris from Tuesday, June 23, to Friday, June 26, in the Salle of the Société des Agriculteurs de France, No. 8, Rue d'Athènes.

Though the ordinary general meeting of corporate members will take place on the Tuesday morning—at the unusually early hour of 8.30—yet on the previous Monday evening, at 6.30, some proceedings in connection with the congress will be held; for the Committee of the Société Technique will then give a reception to the foreign delegates of the International Commission for the Standardization of Screw-Threads of Gas Apparatus, and Sub-Committees in connection therewith will be nominated. Private meetings of this Commission will be held at 10.30 in the morning of each of the three following days; while on Friday, June 26, their report will be issued.

At 2 o'clock on Tuesday, June 23, the general congress of all members will be opened, and the usual awards announced and distributed. A report on the establishing of a mutual benefit aid gas society will be read. A start will also be made with the technical papers, which will be resumed on the following (Wednesday and Thursday) mornings. There will be two sittings devoted to the recently instituted "Séance de Discussions" on the Thursday afternoon and Friday morning. The subjects named for discussion are: (1) The diffusion of flame—M. Casaubon's paper at the 1907 congress. (2) Vertical and other retorts; the duration of carbonization; the importance of the weight of charges. (3) Automatic lighting and extinguishing of gas-burners. (4) Naphthalene; its production and means of avoiding it.

Visits will be paid to the works of the Cie. Française des Métaux, at St. Denis, and to the famous Abbey there. A third visit will be to the electrical cable works of the Société Industrielle des Téléphones, at Bezons. The annual dinner will be held on Thursday evening, at the Restaurant du Grand Hotel; and the congress will close with a "Soirée Artistique" on Friday. It is hardly correct, however, to say that the congress will conclude on the Friday; for a visit of a minimum of 40 members is proposed to see the Franco-British Exhibition. The circular states that this exhibition, "having a section reserved for the gas industry, will offer some items of interest. To allow of visiting it, a collective excursion has been arranged, which will leave Paris on Sunday, June 28, and return from London on Wednesday, July 1." Ladies will take part in it; and the inclusive price will be about 160 frs. (£6 8s.). The announcement continues: "Thanks to the habitual kindness of our colleagues over the Channel, and to the warm welcome we always receive from them, we hope also to be able to profit by our stay in England by making some visits to industrial works." It only remains for us to add an assurance of the pleasure that it will give British gas engineers and others heartily to welcome our French colleagues, and to wish them a successful annual meeting.

Alderman Lawley Parker, of Birmingham, whose death was announced in the "Journal" for the 24th of March, left estate of the value of £53,917 gross and £56,185 net. Mr. G. J. Gadsdon, one of the Directors of the Ilford Gas Company, who died a few weeks ago, left £23,980.

THE SCOTTISH NATIONAL EXHIBITION.

The Scottish National Exhibition in Edinburgh was opened on Friday by H.R.H. Prince Arthur of Connaught. It is not an extensive exhibition; and the Executive seem to have accentuated the idea of smallness by crowding into one corner all the buildings in which articles are exhibited—leaving the greater part of the space to be devoted to the accommodation of appliances for providing the entertainment, which is indispensable in all such institutions. The opinion has been hazarded that the exhibition will live upon its amusements; but this opinion has been formed before the more serious part of the exhibition is in position. The weather and other conditions have greatly interfered with the getting in of goods and materials. The consequence is that a great many of the exhibits are not yet shown. Apart from the lighting [see next page], there is really very little in the exhibition which concerns "Journal" readers.

The lighting of the grounds, so far as the portion assigned to gas is concerned, is complete; and the same may be said of the buildings which are lighted by gas. Of the grounds, three-fourths, roughly, are lighted by incandescent gas-lamps, and the remaining fourth has been assigned to electricity. The gas-lighted portion, too, is the "front" part; electricity having been relegated to the part where nothing but frivolities reign. This is a reversal of the policy which has hitherto found favour with exhibition-mongers. It is satisfactory to know that those who are responsible for the gas lighting have proved themselves thoroughly up to date. On Saturday there was not a single gas-lamp not alight; and the lighting effect, so far as illumination was concerned, was admirable. The light shed on the open spaces in the grounds was quite manifestly ahead of even the very fine display in the Dublin Exhibition of last year. The lamps and standards are small, and in the daytime unobtrusive. At night they light the grounds admirably; but they seem to have been placed with a view to individual effect, leaving the general effect out of view. The great thing is that the lighting by gas has been, when an opportunity was offered of allowing to be shown what could be done by it, so arranged as to give a satisfactory and convincing result. In the part of the grounds relegated to electricity, the result was unsatisfactory in the extreme. Very few of the arc lamps have been fitted up. Only a few were lighted, and these were around the water-shoot, which was not working. In the parts where the other amusements were being plied, the only light provided was by the incandescent electric lamps—mostly coloured—which the concessionnaires had fitted up to light their own particular places; and the crowds had to tread, either through the mire or upon slippery gangways temporarily laid down, in order to reach them, while the "sensational" events which were being largely patronized were carried through in darkness only relieved by the borrowed light derived from the illuminated portion of the grounds.

At the meeting of the Royal Society of Arts on the 13th inst., Mr. Clayton Beadle will read a paper on "The Underground Water Supplies of the Thames Basin."

In the list of contributors to the Guarantee Fund for the Gas Engineering Section of the Franco-British Exhibition given in the "Journal" last week, the contribution of £25 was made by the owners of the Pelton Gas-Works (a private concern), not, as was stated, by the Chester-le-Street and Pelton Gas Company.

We have received from the publisher of the "Gas World" the latest of the series of useful handbooks issued from the office of that publication. It is entitled "Self-Instruction for Students in Gas Supply," and deals with the elementary branches of the subject. It is a reprint of articles by "Mentor" which have appeared in our contemporary, and its object is to assist students preparing for the examinations of the City and Guilds of London Institute. The information, which is freely illustrated, is imparted in the form of question and answer, which has been found best suited to those who are not able to attend classes, or have not the opportunity of obtaining access to technical libraries. The book is similar in style to the others of the same series; and its price is 3s. 6d. net.

A new regulator (the Didelon) to automatically control the flow of water through sand filters is now being largely used on the Continent. The apparatus is fixed in a chamber connected with the supply chamber of the under-drain system by a pipe closed with a balanced inlet-valve opening downward. Connected with the valve, and immediately above it, is a float, which carries a syphon-pipe straddling a partition dividing the regulator chamber into two parts. On one side of the partition are the float and the balanced inlet-valve; while the other is connected directly to the supply-mains. When the rate of flow through the filter-bed decreases owing to the increasing resistance of the gelatinous surface layer, the flow of water through the balanced inlet-valve also decreases; the water-level in the syphon-chamber falls; and the float dropping to a lower level enlarges the opening of the inlet-valve into the syphon-chamber, and consequently allows of a greater flow. This increase is due to the fact that more water is discharged through the inlet-valve from the supply chamber of the under-drain system, which accordingly has its water-level lowered, thereby increasing the head on the filter-bed. The apparatus was described in a recent issue of "Engineering."

SIXTY TO SEVENTY CANDLE POWER PER CUBIC FOOT OF GAS.

A New Gas-Lamp to be Seen at the Franco-British and Edinburgh Exhibitions.

WHAT is the limit to the efficiency to be obtained from a cubic foot of gas by the aid of the bunsen burner constructed on scientific lines, used with Welsbach's great invention, the incandescent mantle? There is no doubt a limit; but we will not hazard a defining reply. Experience of progress shows the danger of marking even a possible boundary line to achievement in this connection. Time was when from the common form of incandescent burner 12 to 15 candles per cubic foot of gas of ordinary qualities—not such qualities as obtain in Scotland—was looked upon as the apex of efficiency and economy in illumination by artificial means. Then improvements in ordinary vertical burners and mantles gave us 18 to 20 candles per cubic foot with the gas common to English towns. The inverted burner, by refinement and means of regulation, has further enhanced duty, and now 23 to 25 candles is an efficiency that is easily derivable per cubic foot of gas. Simultaneously, the high-pressure gas or air systems, and the self-intensifying lamps, were being developed; and 30 candles per cubic foot was from them a very general duty, until at length improvement and compression gave round about 40 candles per cubic foot as something to talk about in considering the competition of the electric flame arc lamp. Progress, however, has not ended there; and the James Keith and Blackman Company, Limited, have now made the tremendous leap, which has given to the gas industry, according to the quality of the gas used, an illuminating efficiency from 60 to 70 candles per cubic foot of gas consumed under the high-pressure system. And with the richer gas of Scotland a still higher—but not, considering the difference in illuminating power, a proportionately higher—duty is procurable. Such results as these are worth considering; and we will enlarge upon them before attempting a description of the burner and lamps which accomplish this result.

For some time past, the ever-keen spirits of the firm, who are constantly searching for means of advancing the duty of their lighting productions, have been experimenting with inverted burners for use with high-pressure gas; and they have obtained, by the aid of a simple construction of lamp and inverted burner (which have been patented), the extraordinary efficiency results to which allusion has been made. The experiments giving these results have been made not only by representatives of the firm named, but by others from whom independent testimony has been received by us. The trials were conducted with three sizes of lamps—one of the indoor pattern, and the other two of the outdoor types. With the indoor lamp, and with a consumption of only 2 cubic feet an hour, a light of 60 candles per cubic foot was realized, or 120 candles for the 2 feet. The outdoor pattern of lamps, giving respectively 750 and 1500 candles, yielded—in each case be it marked from a single mantle—as high as 67 candles per cubic foot of gas. The experiments were all carried out by gas drawn from the mains of the Gaslight and Coke Company—gas of 16-candle power, and containing a proportion of carburetted water gas. The gas may therefore be taken as of fair average quality for incandescent gas lighting; so that there is little doubt that similar results can be obtained anywhere in the country. But as we have remarked, where the gas is of higher quality, such as that obtaining in Scotland, rather higher efficiencies will be realizable. For instance, in tests in Edinburgh, it has been found necessary, owing to the high illuminating power of the gas, to reduce the volume consumed in these lamps; but even then, with a 1500-candle power lamp, a light equal to 72·2 candles per cubic foot has been secured under ordinary outdoor conditions. The total consumption by this lamp of a 20·21 candle power gas (tested by the "Metropolitan" No. 2 burner), which is not the normal Edinburgh supply, was 22·9 cubic feet; and the total illuminating power, 1655 candles. This is a very remarkable result. These Edinburgh tests were made with one of Simmance and Abady's portable photometers, and the light was measured practically horizontally.* From this it will be seen that the electricians will not have ground for asserting that this test had the advantage of laboratory refinement. It is particularly mentioned, too, that the test is practically a horizontal measurement. If it had been made at an angle of 45°, undoubtedly a much higher reading would have been obtained owing to the larger area of mantle exposed to the photometer disc. Even at the ordinary height at which the lamps are fixed in the Edinburgh Exhibition—viz., 16 feet—a light of 1685-candle power, or 73·6 candle power per foot, was obtained; the angle in this case being 20°. But, in quoting candle powers, the results obtained from measurements at an angle are not usual; and if the tests are so made, it should be, as here, specifically mentioned, and the horizontal reading be also given, as it is common to think and talk of illuminating power as having been obtained on the horizontal plane.

THE CONSTRUCTION OF THE LAMPS AND BURNERS.

In the construction of both lamps and burners, the experience of years has been brought to bear in amalgamating the details. The fundamental principle of burner and lamp is the heating of the gas and primary air supply by novel means, and also the heating to a less degree of the secondary air supply. Let us take one of the small lamps—one giving 120-candle power—for description first; this being a lamp particularly suitable for factories and other large interiors. The hood of the lamp consists of a reflector with a rising cylindrical casing; and a dome cap through which the gas supply pipe passes. The outlets for the products of combustion is from under the cap; and below, in the cylindrical portion, the air enters for admixture with the gas. The air for the latter purpose is not, therefore, in any way vitiated by the products of combustion. The bunsen tube passes centrally down the cylindrical casing. About the gas-injector there is nothing special; but around the bunsen is placed a gauze cylinder, which prevents any foreign matter passing in with the fresh air supply. At the bottom of the bunsen tube, we come to an important feature of the burner. There we have a small chamber slightly curved top and bottom, and intersected by a metal disc. This disc close to its periphery is perforated by a ring of fine holes. The result is that the heat from the mantle below heats up this disc. The gas and air mixture travelling down the bunsen tube strikes against the heated disc, spreads itself in a thin layer over it, and passes through the fine perforations into the under part of the chamber, and away to the nozzle of the burner. There is a limit to which this plate may be heated; and this has received a great deal of attention (with an ultimate success) from the patentees. But this arrangement really constitutes the main part of the patented invention. Through the side of the cylindrical lamp casing, there protrudes a screw regulator (which can be adjusted by hand without interfering with the burner) for regulating the supply of the mixture. This is the only adjustment that is found necessary; and it acts exceedingly well. Another point is that the burner gauze near the nozzle in the large lamps can be changed without in any way interfering with the mantle. Coming to the mantle itself (the small size of which is referred to elsewhere), we have another unique feature. The burner nozzle is screw-threaded on the outside; the ring carrying the mantle is screw-threaded on the inside. The method of putting on a collodionized mantle is to hold it in its protecting box, and simply screw the mantle on to the nozzle. Should it be desired to remove the mantle again, the protecting cardboard box can be placed over the mantle, and the latter be unscrewed without injuring it.

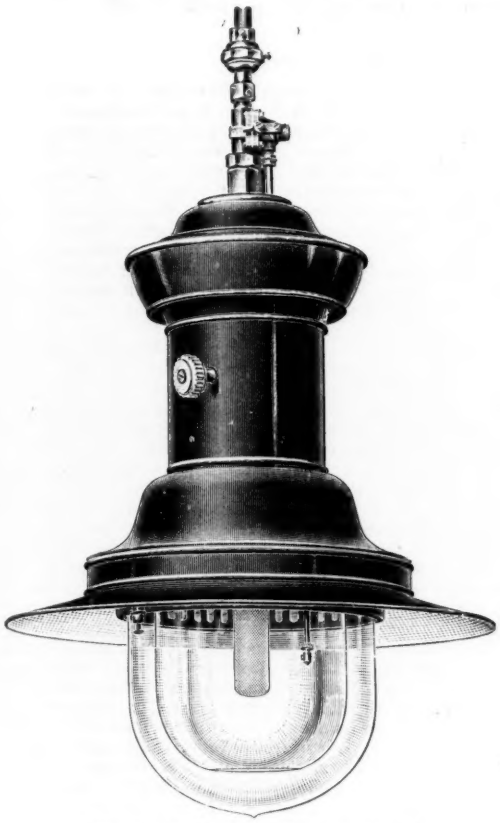
The lamp can be used either without a globe, with a single globe, or with two globes, as fancy or position dictates. But the only way in which the secondary air supply can be properly heated is by the use of the two globes. The outer globe is without an opening at the bottom; and it is carried by a metal frame with air-inlets in it. A second but smaller globe (with an opening at the bottom) is inserted in the larger or outer one. The result is that an annular space is formed by the two glasses, down which the air has to pass for supporting combustion; and thus it is heated in its travel before flowing into the inner globe and reaching the incandescent mantle. Without a globe, an illuminating power of 50 candles per cubic foot is realized, with one globe 55 candles, and with two globes 60 candles. Of course, under certain circumstances, it might be more economical to dispense with the outer globe, and sacrifice the additional light secured by its aid. The glasses, by the way, are held in position in the lamp by a simple wire spring; and the diameter of the inner globe is such that it is kept quite clear of the mantle. No risk of the glass melting is therefore incurred. These small lamps will be lighted from the top with a torch, having a claw fitted to the upper part for turning the tap up or down.

It is by the combination of these various points, each of which taken separately may be deemed to be simple, that the large advance in efficiency has been produced. To have devised a practical combination that has yielded an advance of such a character is a notable work. Many a time have the inventors been, as they thought, on the verge of success in realizing a big gain in efficiency, when some defect has revealed itself, and there has been disappointment. Perseverance is now rewarded.

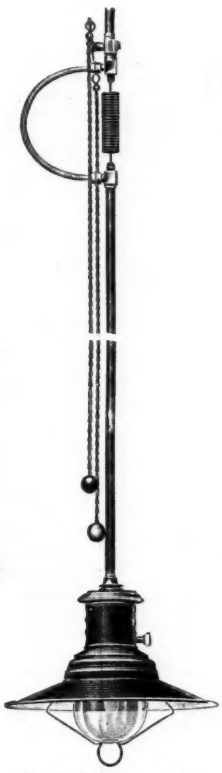
That—the 120-candle power—is the lower extreme in the range of lamps. We will get to the other extreme now, and examine the 1500-candle power outside lamp—1500-candle power from one inverted mantle! In its radical features, it is the same as the small lamp that has been under description. But in this case the globes are supported by a gallery—the inner globe being held up by a bayonet joint, and the outer one in a ring. The nipple of the gas-injector can be removed, attended to, or changed by breaking a single joint. It is also noticed that a simple dust-trap is provided, to prevent particles of dust that may pass along with the gas stopping up the outlet-hole of the gas-injector. It is important to guard against trouble of this kind. When it is desired to remove the glasses of these outside lamps for any purpose, three clips are provided for supporting a cylindrical metal protector for the mantles. These large lamps will be lighted by bye-passes on the ordinary system.

In the case of the lamps at the Franco-British and Edinburgh Exhibitions, the lighting and extinguishing will be controlled from the compressing plant. The pressure at which these new lamps are supplied with gas gives such a big margin that control of the lighting and extinguishing by increase or reduction of pressure is a simple yet positive matter; and makes the system very suitable for such uses as railway stations and yards or extensive works. A large and complete lighting system can be dealt with in this way by single piping in series.

* At our invitation, Mr. Herring has kindly supplemented these tests; and they are annexed to this article.—ED. J.G.L.



The New Lamp (Large Form) as Used at the Exhibitions.



The Small Form of Lamp and Fittings.

The over-all dimensions of the outside lamps are 2 ft. 6 in. from top to bottom, with 24-inch shades—about the size to which, two years ago, the Keith and Blackman Company were building their 300-candle power lamps.

The enamelled parts of the lamps are made free of screw-holes; and past experience allows of a long life being predicted for them. The lamps are only going to burn half the gas that was consumed by those the firm had at the Dublin Exhibition—that is to say, a reduction of 50 per cent. in consumption is made possible since last June for an equivalent illuminating power. When the lamps were taken out of the Exhibition grounds at Dublin, the enamel was found to be as good as the day they were put in. The first heat soiling of the inside white parts was all the damage, and that was easily rectified.

It is proposed to make the new lamps in three sizes for outdoor use, giving respectively 500, 1000, and 1500 candle power; and for indoor purposes, a range of lamps giving from 60 to 1000 candle power is to be produced. The smaller sizes of lamps—say, from 60 to 150 candle power—will be available at quite an early date; and the whole series of lamps will be ready for next season.

A Small Mantle for a Large Power.

One of the most remarkable features about these new lamps, next to the hitherto unattained efficiency, is the smallness of the mantle, compared with the largeness of the illuminating power. Off hand, we should accept it as an incontrovertible proposition that to obtain a light of 1500-candle power from a single mantle, the mantle would have to be of considerable area. But with these lamps it is not so, owing to the concentrated character of the flame. Take the lamp consuming only 2 cubic feet of gas, the mantle is merely $\frac{1}{2}$ inch in diameter by 1 inch long. It seems ridiculous, looking at the mantle, that such a midget structure should have an illuminating capacity well attested at 120 candles. Or take the 1500-candle power mantle, that is only $1\frac{1}{2}$ inches in diameter by $3\frac{5}{8}$ inches long. Here we have—considering the large area of mantle in former high-pressure practice and in cluster lighting to get high illuminating powers—not only an interesting point, but a striking confirmation of the fact that the characteristics of the flame rather than the mantle area are of supreme importance in the attaining of higher efficiencies in incandescent gas lighting. And from the point of view of maintenance, the reduction of mantles to a single one for such an illuminating power as 1500 candles lessens the chances of mantle breakage, and therefore decreases the cost of maintenance; and, moreover, the greater the area of any single mantle, the greater the liability to destruction. Herein, then, is an important point.

The method of fixing the mantles to the burners is treated upon in describing the construction of the lamps; but it may be stated here that the mantles used may be of either the collodionized or soft form. A high-pressure gas flame such as we have here is particularly suitable for burning off soft mantles, and shaping each one to the particular flame to which it has to accommodate itself.

The Pressure and the Compressing Plant.

Owing to the amount of resistance set up in the new lamps, due to heat expansion both of gas and air, it is found necessary to use gas under a pressure of 55 inches. This, of course, dispenses with the use of the Keith water-driven compressors, but those of the rotary type are eminently suitable, and can be driven by gas or steam engines, electric motors, or from any existing shafting. Some information about the compressors is given in the paragraph treating of the lighting by these new lamps at the Franco-British and Edinburgh Exhibitions.

Cost and Maintenance.

It will be a simple matter of arithmetic for gas engineers to calculate, from the efficiencies quoted and the total candle powers of the various sized lamps, the expenditure for gas for any given time or number of lamps; but at present, until the lamps have been in use under ordinary conditions over a long period and (the outside ones) in all weathers, it would serve no useful purpose to quote figures that are purely estimates as to the cost of maintenance, &c. Such costs based upon a single lamp are often largely modified when spread over a number of lamps. But we feel some confidence in saying—having regard to the special details in construction of the lamp and mantles, and the fact that one mantle suffices for each lamp—that the cost of maintenance will be moderate, and that the lamps themselves will not be subjected to any large amount of wear and tear. On this question of maintenance, the Keith and Blackman Company have promised to supply data when a period of trial on a scale that shall be unchallengable has been passed through.

At the Edinburgh and Franco-British Exhibitions.

Naturally, readers will be anxious to see these burners in use. Both in the North and the South, their desire will be immediately gratified, and on a large scale. Some 127 of the 1500-candle power lamps have been erected, and are now lighting the major portion of the grounds at the Scottish National Exhibition, Edinburgh; and the James Keith and Blackman Company are also fixing rather more than 200 lamps for the lighting of a large section of the grounds at the Franco-British Exhibition at Shepherd's Bush. The Institution of Gas Engineers, the Société Technique, and gas engineers from other countries, will be visiting the latter exhibition, and so will be able to judge for themselves of the character of the lighting by this latest and striking development in the application of high gas pressures to inverted burners and mantles, both of which are decidedly of novel feature. The lamp, as seen burning at the Scottish Exhibition, is (a correspondent informs us) "a magnificent example of gas lighting."

It may be of interest to state that so far as the gas compression and the control of the lamps are concerned, the arrangements at both exhibitions will be identical. The compressing plant is of the rotary type, driven by gas-engines—in one instance, direct driven; in the other, belt driven. The plant in each case is in duplicate.

The lamps are all of 1500-candle power nominal, which will be about the average lighting power with London gas, but will exceed it in Edinburgh. There will be, as said above, rather more than 200 of these lamps at the Franco-British Exhibition; but reckoning 200 only at 1500 candles, the lamps will give an aggregate illuminating power of 300,000 candles. At Edinburgh (without making any allowance for the somewhat higher efficiency owing to the superior quality of the gas) the 127 lamps, taking the nominal duty, will give 190,500 candles. It will, however, be remembered that the Edinburgh tests gave, with 20-21 candle power gas tested by the "Metropolitan" No. 2 burner, an efficiency of 72·2 and 73·6 candles per cubic foot of gas.

Regarding the height of the lamps, the heads of those at the Franco-British Exhibition will be 13 feet from ground level; and the majority at Edinburgh are 16 feet.

The lamps are controlled by a diaphragm valve for lighting and extinguishing from the compressors by respectively raising the pressure from normal and reducing it.

Here we have in this new lamp a big advance in efficiency—an advance of which there is no shadow of doubt. Experts in gas lighting who have seen the lamp, and have had it under test, are enthusiastic about it, and predict that it is going to be an effectual competitor of the electric flame arc lamp both in cost and efficiency.

At our invitation, Mr. W. R. Herring has kindly furnished us with the results of tests made at Edinburgh with the new lamp, and they confirm its remarkable power. Illuminating powers of between 1572 and 1705 candles from a single mantle, and giving

an efficiency per cubic foot of gas consumed of between 64·9 and 73·6 candles open up quite a new phase for the gas industry in the science and art of illumination. The tests (which are attested by Mr. Herring) are as follows:—

Photometrical Tests on Keith's New High-Pressure Inverted Lamp—One Mantle Light. Mantle 3⅝ inches long by 1½ inches diameter, slight bulb shape.

The quality of the gas used in these tests would be 20 to 21 candles when burned in a No. 2 "Metropolitan" burner, and the calorific power of the gas approximately 560 net.

The test was taken on a Simmance and Abady's street photometer, which had been previously verified by testing a given lamp simultaneously on a 100-inch bar photometer, and the portable photometer in the same room and under like conditions.

Pressure.	Height of Lamp from Floor.	Distance of Lamp from Photometer Disc.	Angle.	Feet-Candles at Photometer Disc.	Consumption. Feet per Hour.	Candle Power.	Candle Power per Cubic Foot.
Inches.	Ft. In.	Ft. In.					
61	4 6	40 0	2½°	1·05	24·6	1683	68·4
61	16 0	42 4	20°	0 95	24·6	1705	69·3
61	20 0	29 9	37°	1·81	24·8	1609	64·9

Remarks: Clear globe. Slight leak in the meter, which did not affect the index when the burner was shut off, but which may have affected the consumption.

April 29, 1908.

Photometrical Tests on Keith's New High-Pressure Inverted Lamp—One Mantle Light. Mantle 3⅝ inches long by 1½ inches diameter, slight bulb shape.

Pressure.	Height of Lamp from Floor.	Distance of Lamp from Photometer Disc.	Angle.	Feet-Candles at Photometer Disc.	Consumption. Feet per Hour.	Candle Power.	Cand'e Power per Cubic Foot.
Inches.	Ft. In.	Ft. In.					
61	4 9	40 0	4°	1·04	22·9	1655	72·2
61	16 0	42 1	20°	0·95	22·9	1685	73·6
61	20 0	28 9	37°	1·90	22·9	1572	68·6

Remarks: Clear globe. A slight leakage in the pipe amounting to 0·09 foot per hour, which has been allowed for.

April 30, 1908.

On Friday night, four of the lamps were lighted up in Kingsway; and the effect was excellent—the illuminating power of each being quite 1500 to 1600 candles.

Elevated Water-Reservoir at Lüneburg.

The town of Lüneburg, in Hanover, has lately been provided with an additional supply of water obtained from borings; but as it was found to contain a large quantity of iron, it was necessary to subject it to special treatment before it could be distributed. When carrying out the arrangements to effect this improvement, it was decided to increase the pressure by pumping the water into a reservoir, of about 110,000 gallons capacity, constructed on the top of a brick tower 178 feet high, designed to harmonize with the old belfry of a neighbouring church. The reservoir, which is described and illustrated in the "Génie Civil" for the 25th ult., is 33 feet in diameter; and the water flows into it through four sand filters, each composed of six columns 13 feet high and 6 ft. 6 in. diameter. When the reservoir is empty for repairs, the water can be distributed direct from the filters. It is aërated by passing through a series of baffle-plates, which break it up into a number of small jets. It is stated that by this arrangement there is much greater absorption of oxygen than in the case of a mere cascade in spray. These plates are about 400 feet in length, and are enclosed in open-work sheet iron, similar to Venetian blinds, to prevent splashing. The plant, including the filters, but not the turbine used for pumping, cost about £9000. Building operations were commenced in November, 1905, and extended over two years. The total weight of the tower and the reservoir when full is about 4580 metric tons.

The ceremony of cutting the first turf in connection with the erection of a huge cotton-mill for the Ena Spinning Company, Limited, recently took place at Atherton. The site on which the factory is to be erected covers an area of 15,875 square yards. The mill will be entirely fireproof, and its most noteworthy feature will be the system of driving, which will be effected by one of Mather and Platt's two-cycle gas-engines of 1400 H.P. It will be placed in a house 70 ft. by 36 ft., provided with a travelling crane.

In the "Journal" for the 24th of March, we gave an abstract of a paper on "The Recovery of Cyanogen Compounds in the Dry Distillation of Coal, and the Disposal of Effluents from Ammonia Stills," read by Dr. J. Grossmann before the Yorkshire Section of the Society of Chemical Industry, in Sheffield, in the preceding week. Those of our readers who are specially interested in the question dealt with by the author will find the full text of his paper in the current number of the "Journal" of the Society.

LIGHTING PROGRESS IN AMERICA LAST YEAR.

The American "Illuminating Engineer" in its March number devoted some little attention to the advance made in lighting matters during the past year, so far as the United States is concerned. Reference is made to the financial panic which had overtaken the country; but, in spite of this, the year had, says our contemporary, been marked by a large measure of progress in illuminating engineering. The Society devoted to this work had continuously increased its membership; the number of professional illuminating engineers had largely grown; the profession was being acknowledged by special courses of instruction in some of the technical schools; and, generally, lighting companies had recognized the science by either assigning one of their present employees to the work, or else engaging for the purpose someone already proficient.

In connection with technical instruction, it is interesting to note that the definite courses in illumination adopted by a few institutions are fairly comprehensive. The following synopsis of a course at the University of Wisconsin may well be taken as an instance: The nature and scope of illuminating engineering; the elements of light, its production and the phenomena of its propagation; the concepts, units, and terminology of light and illumination; the principles of vision and the physiological features of illumination; photometric devices and their use; standard sources of luminous intensity; the representation and application of photometric data; the Rousseau diagram and its applications; the calculations of illumination; the thermodynamics of light production by incandescence and luminescence; incandescent electric illuminants, their materials, manufacture, accessories, thermal and operating characteristics, rating, performance at different frequencies, testing, colour values, and a comparative *résumé* of their operation and illuminating value; the properties and characteristics of carbon, luminous and mercury arcs, and of vapour and vacuum tube illuminants; gas and gas illuminants; shades, reflectors and fixtures; general considerations and methods of design for various classes of interior illumination; street lighting; decorative and display lighting; and the elementary principles of art applicable to illumination. The foregoing is supplemented in the laboratory by various photometric and other experiments.

In further discussing illuminating engineering, our contemporary says the material advancement of the science had been equally great. Dealing with electricity, a future is anticipated for the tungsten and the luminous or metallic arc lamps as representatives of its two chief phases. Vacuum-tube lighting could not be said to have made progress. In the field of gas illumination, the inverted burner is regarded as the most important factor in determining progress in the States; and its adaptation to clusters or gas arcs is predicted as a practical commercial light source. High-pressure or artificially intensified burners had not so far established themselves as in England and Europe. The "Illuminating Engineer" was not, however, content with expressing opinions, but, in order to obtain a general review of the year's progress, sent letters of inquiry to a number of representative manufacturers, central stations, and gas companies. The replies received give some indication of the state of affairs.

Taking the gas industry first, progress in many respects has been very satisfactory. Mr. J. D. Shattock, of the Suburban Gas Company, Chester (Pa.), speaks of considerable advancement in the lighting business during the past year, particularly in the adoption of different forms of inverted burners; and, in discussing the general position, he thinks that more business could be done, both in gas and electricity, by employing a larger number of smaller units instead of the glaring arc lights of both systems. Mr. Carl H. Graf, of the Indianopolis Gas Company, refers to a general willingness on the part of merchants and others who have adopted the gas arc method of lighting to testify to its efficiency and economy. The Detroit City Gas Company, through Mr. Alonzo P. Ewing, speak also of a considerable advance in their business, having gained as many gas arc lamps during the year as the total number that the Electric Light Company have on their lines. The present number is 15,556 gas arc lamps; and a large percentage of these are being maintained by them. Mr. Ewing says that inverted burners are selling well for middle-class homes; electricity being replaced, from the standpoints of economy and the kind and quality of light. He makes reference to the possibilities of an inverted arc lamp as being something which will suit merchants and others who like changes from time to time. So far as Chicago is concerned, Mr. J. C. D. Clark, of the People's Gaslight and Coke Company, writes most enthusiastically. All their business and other houses are demanding improved illumination; and he says "there is no question about it, business in the lighting field is going to be booming." Mr. W. H. Gartley, of the United Gas Improvement Company, strangely ignores incandescent gas lighting, and writes as he might have written years ago. He speaks as to the improvements effected in Bray burners, and of the practice of many gas companies to supply and fix them free of charge. The vast number of these burners in use throughout the country marks, to his mind, "a distinct advance in illuminating engineering from the gas point of view."

The expressions of opinion so far as electricity is concerned come chiefly from manufacturers. Some of these speak of satisfactory and increased sales; while others confine themselves to a

statement of the use and possibilities of different type of lamps. A good deal of hope is expressed as to the future of the tungsten lamp; and the flame arc lamp has also incited anticipation of increased business. One tendency of the times is suggested by Mr. J. C. Fish, of the Shelby Electric Company—that light-users are demanding more for their money than ever before, and central stations are therefore carefully considering every change likely to effect improvement of service to their customers. One cannot but feel, in reading between the lines of these various letters and comments, that while there has been progress in both fields, the gas industry has had the greater share.

Turning to the sphere of street lighting, one of the "Illuminating Engineer" contributors, Mr. H. Thurston Owens, remarks that general interest in public lighting has shown the same remarkable growth during last year as that in interior illumination. The conditions of the average American city are not so favourable for good street lighting as those of European cities—unsightly poles, overhead wires, and poor reflecting building fronts being against success. However, when a city does conclude that it is "behind the times," it proceeds to "whoop things up" with a vengeance; the frequent consequence being that certain streets are lavishly lighted and the rest left inadequately illuminated. Notable examples of this are found in Los Angeles (Cal.), Denver (Col.), and Buffalo (New York). The writer states that every city of more than 30,000 population uses arc lamps—the mantle gas-lamp easily ranking second. Though there are more electric arc lamps in use for street lighting in the States than any other single type of light source, the reason is not due to their superiority. They were well advertised, and they "took." The tide is now beginning to turn, and in cities where the facts have been realized and money has been available, they have been removed, and either incandescent or mantle gas substituted.

It is perhaps not necessary to follow Mr. Owens in his discussion of the various street lamps, since these include all classes starting with oil. In the case of gas lighting, open-flame burners are being replaced by mantle burners more rapidly than for interior purposes. Mantle gas-lamps, he says, rank next in number and popularity to electric arcs, and their use in connection with the latter type seems to be the natural trend in cities of any size. These lamps have a number of features placing them far above their rivals—viz., economy, low intrinsic brilliancy, and pleasant quality of light. Reference is made to flame arc lamps, which "had fortunately not made much headway," and also to luminous arcs—these not having increased as rapidly as expected.

The article includes a note on ornamental and spectacular public lighting to which in some cities attention is being increasingly paid.

PERSONAL.

Out of ninety applicants, Mr. JAMES TAYLOR, of Oldham, has been appointed Gas Manager to the Mossley Corporation in succession to the late Mr. H. J. Robinson. Mr. Taylor has been engaged with the Oldham Corporation Gas Department for some seventeen years, and since 1901 has been Resident Manager at the Hollinwood works.

Mr. GEORGE W. CROSS, having tendered his resignation, the Directors of the Hathersage and District Gas Company have appointed Mr. T. H. BROWN, of Matlock, to be Manager. Mr. Brown received his training at Matlock; and was then for four years Assistant-Manager at Sleaford, under Mr. Harry Wimhurst. He was afterwards, some 3½ years since, appointed Assistant-Manager at Matlock, which position he now vacates to go to Hathersage. The vacant post of Assistant-Manager at Matlock has been filled by the appointment of Mr. J. W. BROWN, of the Tottenham and Edmonton Gas-Works.

The inauguration of Lord RAYLEIGH, the Chief Gas Examiner for the Metropolis, as Chancellor of the University of Cambridge, in succession to the late Duke of Devonshire, took place on Friday at the house of Mr. Balfour, No. 4, Carlton Gardens, S.W. The ceremony was attended by about thirty representatives of the University, including the Vice-Chancellor, the Masters of Magdalene, Pembroke, and Caius, the Provost of King's, the Public Orator (Dr. Sandys), and Sir Robert Ball. The Vice-Chancellor presented to Lord Rayleigh the letters patent of his office; and the Public Orator delivered a speech in Latin in which he recalled that the seventh Duke of Devonshire had presented to the University the splendidly equipped Cavendish Laboratory, and that Lord Rayleigh had made it the scene of his brilliant researches in electricity during his five years' tenure of the Professorship of Experimental Physics. Lord Rayleigh, after referring to the irreparable loss which the University had sustained by the death of the late Chancellor, said that he himself, in the first instance, was drawn to Cambridge, in face of some family tradition, by its fame as a school of mathematics and science and as the nursing mother of Herschell, Kelvin, Stokes, and Adams.

The subject of combustion without flame, and its application to lighting with incandescent mantles, has lately been dealt with by M. Jean Meunier in a communication to the Paris Academy of Sciences. The author is of opinion that the temperature of the mantle is much higher than that of the flame surrounding it; and he attributes this to the fact that each particle of oxide becomes the focus of intense local combustion.

OBITUARY.

The death occurred, with painful suddenness, last Friday of Mr. JOHN MALLINSON, the Surveyor and Engineer to the Skipton Urban District Council. Deceased, who was a young man of considerable promise in his profession, was trained in the office of the Borough Surveyor of Batley, and on the death of his father, some years ago, succeeded him in the office of Surveyor and Engineer at Skipton. When the present scheme of waterworks was begun, three or four years ago, Mr. Mallinson was entrusted with the construction of the pipe-line from the source at the foot of Embsay Moor to Skipton, by means of which the town was connected with a much-needed and augmented supply of water; and his task was carried out to the complete satisfaction of the Council and of Messrs. George H. Hill and Son, the Engineers for the complete extension scheme.

We greatly regret to learn of the death, on Thursday last, of Mr. FRANK H. LEEDS (son of Mr. John Leeds, B.A.), at his residence at Bridport. Mr. Frank Leeds was born in 1867, and received his training in chemistry at the Pharmaceutical Society's laboratories at King's College, London, and at the laboratory of Professor R. Fresenius at Wiesbaden. He held appointments first at the tar and ammonia products works of the Gaslight and Coke Company at Beckton, and subsequently at the aniline dye works of Messrs. Brooke, Simpson, and Spiller, but was forced to resign the latter post as the state of his health practically confined him to the house in winter-time. Seeking other outlets for his energies, he devoted himself to technical journalism and literature, and, having regard to the limitations imposed by his indifferent health, he achieved conspicuous success in this direction. He was Editor of the periodical "Acetylene," and author (in collaboration with Mr. W. J. A. Butterfield) of a text-book on acetylene. He was a regular and valued contributor to many technical papers, including the "JOURNAL." He was a Fellow of the Institute of Chemistry, a Fellow of the Chemical Society, and a past Member of the Society of Public Analysts.

A SUCCESSFUL GAS EXHIBITION.

THERE is at the present time to be seen within the sphere of operations of the Brentford Gas Company an exhibition of appliances for the advantageous employment of the commodity they supply to an ever-increasing number of consumers, which has "caught on" in a manner that must be extremely gratifying to the Company, to their Engineer (Mr. Alex A. Johnston), and to the firms who are taking part in the show. We have called it an exhibition; but a more accurate term to have applied would have been a series of exhibitions, inasmuch as various parts of the Company's district are being visited in turn. To be precise, eight places have been fixed upon; and from a Monday to the following Friday night is spent in each. Hanwell and Southall were the first two districts favoured; last week it was the turn of Hammersmith. Now the exhibition is at Barnes; and the places which still remain to be visited are Twickenham, Chiswick, Ealing, and Hounslow. Such a lengthy campaign when planned, of course, held out very considerable promise of success; and this promise has already been more than amply fulfilled.

Beginning on a somewhat smaller scale, the exhibition when it opened last week at the Hammersmith Town Hall may be taken as having reached its prime; and in order to perpetuate its memory, the aid was invoked of that most truthful of historians, the camera. The result is the three excellent pictures reproduced on pp. 282-83, which give a better idea than any written description could do of just what was to be seen, and how it was arranged. Realizing therefore the superior powers of the illustrations in this respect, we will refrain from attempting to give any detailed account of what was seen when visiting (among many other people) the Hammersmith Town Hall in the middle of last week, but will, as far as they are able to do so, leave the photographs to speak for themselves. A few words of explanation and comment are, however, necessary; and it may perhaps first of all be not out of place to remark that the pictures are some of the best we have ever seen taken by gas—or, for the matter of that, any other—light. The one showing the bed-room, dining-room, and drawing-room was taken at 9.45 p.m.; and that depicting the remainder of the suite of rooms, a little before 7.30 p.m. The exact length of the exposure allowed, we cannot say; but judging by the appearance—or rather the non-appearance, save for a slight shaded mark on the dial—of the long hand on the clock in the latter photograph, it was probably about six or seven minutes. The hall, it may be remarked in this connection, is a very spacious one, and its main lighting was effected by means of six of Sugg's "Belgravia" 2000-candle power high-pressure incandescent gas-lamps—three more of which lights were placed outside the building.

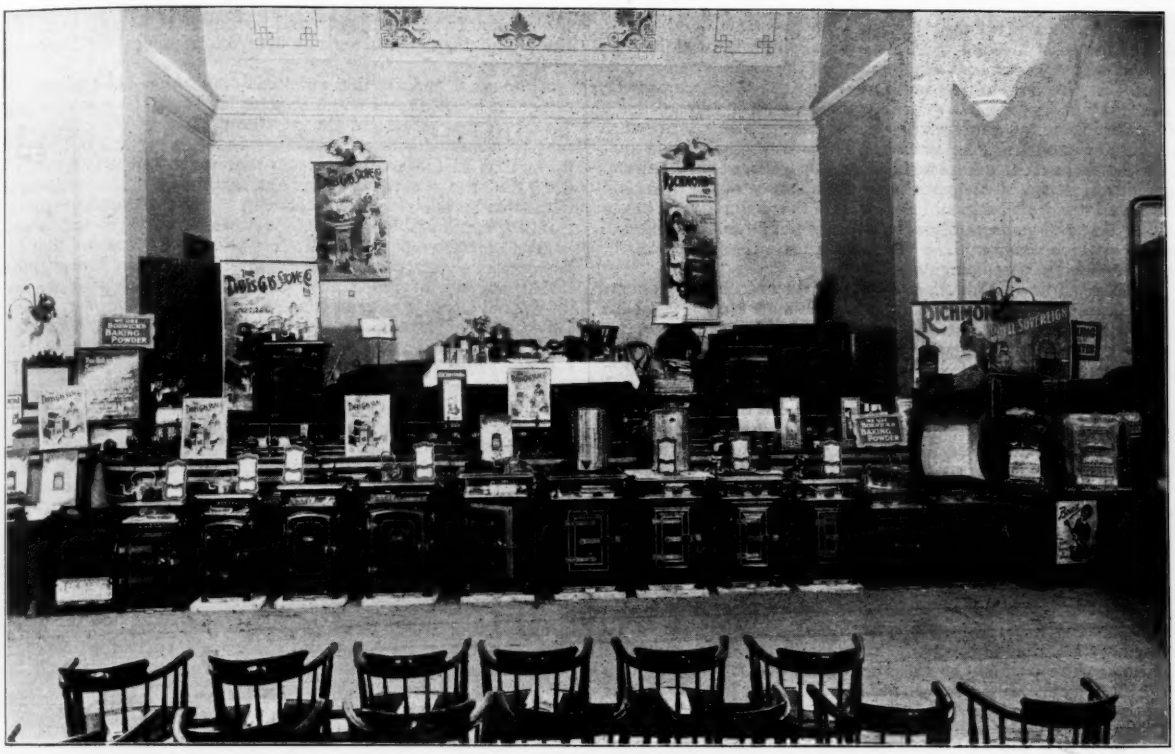
The exhibitions are being carried out by the Brentford Gas Company in conjunction with the Richmond Gas Stove and Meter Company, the Davis Gas-Stove Company, Messrs. Bland and Co., the New Inverted Incandescent Gas-Lamp Company, Messrs. W. Sugg and Co., and Messrs. W. Perring and Co., who have supplied the furniture for the model flat. These firms comprise the exhibitors, with, in addition, a stall which the Gas Company themselves have, and on which are displayed a large

The Gas Exhibition in the Brentford District.—A Side View.

number of attractive gas-lights and fittings—mostly those of Messrs. J. & W. B. Smith. Both indoor and outdoor lamps can be either purchased or hired on easy terms from the Company. The gas-cookers on view include all the latest patterns of the firms named which are most calculated to appeal to the residents in the district for hiring-out purposes; and there are also to be seen various useful cooking appliances. In addition to this, both firms make an excellent show of coloured enamel fires and of boiling-rings finished in a similar style. These latter are selling in large numbers, as their decorative appearance, together with the fact that they can be had in many colours, gives them a great advantage under many conditions over the plain black pattern.

The furnished rooms, which are six in number—bedroom, dining-room, drawing-room, study, bath-room, and kitchen—are naturally a source of great attraction to the visitors, who are thus enabled to see how well modern gas-lighting and effective gas-fires harmonize with tasteful furnishing. The fires are the Richmond and the Davis patterns; and in the bath-room both firms exhibit their systems of supplying hot water under pressure. In addition to the lighting of the inside and outside of the hall, Messrs. Sugg and Co. show in operation at their stand, the "Wimbledon" one-burner 1000-candle power incandescent gas-lamp and the "Newark" and "Chertsey" lamps, which have two burners, and give a light of 1200 candles, or 600 candles per burner; and there are some high-pressure inverted gas-burners. No. 1 and No. 2 hot-air engines, with gas pressure increasers, are to be seen; the former suitable for small installations up to 6000 candles, and the latter for those up to 17,000-candle power. Both the New Inverted Company's and Messrs. Bland and Co.'s stands are, as will be seen from the illustrations, crammed full of the latest appliances for inverted gas lighting; and on looking at them, one is forcibly struck with the great improvements that

The Gas Exhibition in the Brentford District.—The Other Side and End View.



The Gas Exhibition in the Brentford District.—The Lecture Platform.

have been effected in fittings for this popular system of illumination. In the study there is fitted a rise-and-fall "Hanwell" pendant, with one of the New Inverted Company's burners; and there is also to be seen one of the Company's recently introduced reading lamps for the desk, which can be raised and lowered or moved to either side at the will of the user. A noticeable feature of Messrs. Bland and Co.'s stand is a large glass case, which illustrates the method of mantle manufacture in its various stages, from the materials used to the finished article; and the firm also display their high-power outside lamp, for two, three, or four lights, from which it is stated that the light obtained is equal to 120-candle power per burner. The clustering of the burners close together gives the lamp a neat appearance.

As will be anticipated, the model flat and stands above referred to, excellent as they are, do not comprise the sole attractions of the exhibition. Miss S. Barker gives cookery lectures and demonstrations each afternoon and evening; and at the close of the afternoon lectures, tea is provided free for the audience. For the demonstrations, a Davis and a Richmond cooker is used on alternate days. At intervals there are selections of music by an efficient string band. In order that those visitors to the exhibition who may be impressed with the desirability of having fixed upon their premises any of the appliances there displayed may be put to the minimum of trouble in securing the carrying out of their wishes in this respect, the Gas Company have attached to the programme a post-card, on one side of which is their address, and on the other a request for a representative to be sent to arrange for the fixing of a cooker, inverted lighting, or outside lighting, as the case may be.

What has been stated and shown here is we feel sure amply sufficient justification for complete confidence that the remainder of this series of up-to-date exhibitions will be as successful as the three already held have been. The large attendances experienced prove that those who reside in the district are interested; and the spreading of a wider knowledge of the advantages to be derived from the use of gas for lighting, cooking, and heating will be of lasting benefit to Company and consumers alike.

AMMONIA RECOVERY WITH PRODUCER GAS.

At a recent Meeting of the West of Scotland Iron and Steel Institute, a paper on "Ammonia Recovery in Connection with Producer Gas" was read by Mr. F. J. Rowan. The full text of the communication has been given in the "Iron and Coal Trades Review," from which the following extracts have been made.

The recovery, in the form of ammonia, of the nitrogen existing in carbonaceous minerals commenced, on anything like a large scale, with the practice in gas-works; and this practice, with its attendant investigations, naturally forms the starting-point in a study of the subject. As long ago as 1862, we find Professor A. W. Hofmann, in his report on "Chemical Products and Processes" at the International Exhibition of that year, stating that "the amount of nitrogen in coal is but small, varying from a mere trace to a fraction over 2 per cent., but probably not exceeding on an average 0·75 per cent.; and even of this small quantity only about one-third passes over during distillation in the form of ammonia." Nevertheless, the quantity then annually produced in gas manufacture in London alone was 9723 tons; but the whole gas industry of the country was insufficient to meet the demand for ammonia. The processes of retorting the coal and washing or scrubbing the gases were carefully studied and improved, so that yields of 26 lbs. to 32 lbs., and even more, sulphate of ammonia per ton of coal carbonized in gas-works have been frequently realized since then.

There is little doubt that before this time the distribution of the nitrogen existing in carbonaceous minerals was imperfectly understood, and that consequently the loss of ammonia was greater than was supposed. The attention of chemists was, however, turned to the subject, which was investigated by Foster, Beilby, Tervet, and Young in Britain, and by Grouven, Knublauch, Bunte, and others in Germany. The result was the demonstration that of the nitrogen existing in coal the following is the distribution found when the coal is subjected to dry distillation (the figures being percentages of 100 parts of nitrogen):—

Nitrogen of coal	evolved as ammonia	14·50
Do.	evolved as cyanogen	1·56
Do.	present in the coal gas in the elementary conditions	35·26
Do.	remaining behind in the coke	48·68
		100·00

Various methods were devised for the recovery of the large proportion of the nitrogen which was shown to remain in association with the carbon in coke; and these, in the main, depended upon the combustion, or "incineration," of the coke by means of steam alone, hydrogen alone, steam and hydrogen, or steam and air.

In such processes as that of the manufacture of illuminating gas by the distillation of coal in retorts, the manufacture of coke in coke-ovens, and the production of iron in blast-furnaces, the introduction of steam into the retorts, ovens, or furnaces is inadmissible in consequence of the requirements of these processes. The quantity of nitrogen recoverable as ammonia and cyanogen is therefore limited in these cases to that which is represented by the 26 lbs. to 32 lbs. (or perhaps a little more) sulphate of ammonia now obtained per ton of coal, with 3 lbs. to 4 lbs. of crude ferrocyanide of sodium or potassium, produced in some gas-works, and a possibility of a larger production of cyanide from blast-furnaces when suitable means are elaborated for its recovery. In the industries referred to, it will also be understood that the requirements of the primary process of manufacture fix the limits of temperature, as well as the choice and use of materials; and this has an important bearing upon the quantity and quality of any bye-products which may be recovered in a gaseous or a liquid form. It was, however, in connection with them, and with the allied manufacture of oil by the distillation of shale, that the various processes and apparatus for the recovery of ammonia and tar were worked out, to be subsequently applied to the gas from producers.

The recovery plant first installed at the Gartsherrie Iron-Works for blast-furnace gases, like that which is used in connection with coke-ovens, was modelled on the ordinary gas-works plant. At the Summerlee and Langloan Iron-Works, however, practically new processes were introduced, with a view to fixing the ammonia in the gases while hot, and minimizing the extent of washing or condensing apparatus. The use of steam in contact with the fuel was commenced in shale-oil works, at first without any idea of its selective action upon the nitrogen of the coke, but adopted later by Young and Beilby with the distinct view of obtaining that action, and of thus recovering the large proportion of nitrogen which was found, by the researches already mentioned, to be retained in that combination.

It soon became apparent that the temperature at which the operation of burning the coke in an atmosphere of steam is conducted has a controlling influence upon the ultimate success of the process. Working upon Dr. Grouven's analytical method, in which the carbon (of peat, &c.,) was entirely consumed in an atmosphere of highly superheated steam alone, Messrs. Young and Beilby endeavoured to apply to shale distillation the operation of incinerating the carbon of shale coke by steam alone at a high temperature—using for this purpose a compound retort in which the treatment of the coke was to be a secondary or subsidiary operation, and the oil distillation being carried out at the requisite low temperature in the upper compartment of the retort. In theory, this process seemed to be complete, because it was thought that Dr. Grouven's results would be obtained in the lower section, while the resulting gases would be hot enough to effect the greater part of the distillation by their sensible heat in passing upwards in contact with the oil-bearing shale inside the upper portion of the retort. It was also supposed that a considerable quantity of water gas would be formed, by reaction between the steam and the coke, which, in addition to the permanent gases of distillation, would supply a large volume of heating gas. In practice, however, this theoretical process was impossible.

Careful observation of the production of ammonia in gas-works practice by Mr. William Foster showed that the largest quantities were given off at comparatively low heats, and that as the temperature of the contents of the retorts rose towards the close of the operation of carbonizing, the yield of ammonia appreciably fell off.

Mr. W. J. A. Butterfield, in his "Chemistry of Gas Manufacture," also states that, according to Mr. Lewis T. Wright, at a high heat, when 11,620 cubic feet of gas per ton of coal were yielded, 22·3 per cent. of the nitrogen was obtained as ammonia; at a lower heat, with a make of 10,162 cubic feet, 23·6 per cent.; at a still lower heat, with 9431 cubic feet, 22·6 per cent.; and that Herr Winkler points to nearly 20 per cent. of the nitrogen of coal being obtained as ammonia on distilling in coke-ovens. The facts also as to the dissociation of ammonia by heat, as observed by Professor W. Ramsay and Dr. Sidney Young, lead irresistibly to the conclusion that the formation of ammonia, to be successful, must be a low-temperature action.

In considering the bearing of these facts upon practice with gas-producers, we have to face the difficulty that the conditions required for the production of the highest qualities of producer gas for heating are somewhat antagonistic to those which are necessary for the formation and preservation of a large proportion of ammonia from the nitrogen of the fuel. This is due to the complex character of the relations between temperature and the reactions which take place in producers. The decomposition of unprotected ammonia in a gaseous form in contact with rough heated surfaces begins (according to Ramsay and Young) at about 500° C., and is in most cases fairly complete at about 780° C. The presence of a large volume of steam or some inert gas, however, affords protection to it. Hydrogen admitted to gas-retorts during carbonization increases the yield of ammonia to 35 per cent., and steam at a temperature below 500° C. will convert 60 per cent. of the nitrogen into ammonia.

It results from these considerations that when producers are worked with a view to the recovery of the maximum quantity of the bye-products, the quality of the gas must be to some extent sacrificed; but in practice, with either reversing regenerator furnaces or internal-combustion engines, the loss of heat value is not sufficient to cause any serious interference with the practical efficiency of the apparatus. Ordinary producer gas made from bituminous coal has a theoretical heat value of from 160 to 170 B.Th.U. per cubic foot, while the gas resulting from producers with ammonia-recovery plant has a heat value of from 130 to 140 B.Th.U.; the quantity per ton of coal being practically the same in both cases—viz., about 130,000 cubic feet at 15° C. (60° Fahr.). So that something like 20 per cent. more gas of the lower value must be burned to obtain an equal number of heat units in furnace work. Between 140 and 160 B.Th.U., the increase of gas would be only 12 per cent. In gas-engine practice, manipulation of the proportion of air mixed with the gas and the degree of compression of the mixture employed modifies the result, because high temperature of explosion is here of more importance than quantity of heat. Provided always—and this must be considered as a *sine quâ non*—that for furnace work all the undecomposed water vapour and sulphur are removed from the gas before use, and that for engine work the tar, sulphur gases, and moisture are eliminated. It is becoming better understood that this latter condition forms the real *crux* of the whole question. The more the subject is studied, the more clear and definite becomes the conclusion that a successful method of ammonia recovery, from the points of view of the gas and tar products, as well as that of the ammonia, depends entirely upon the temperature treatment of the gas.

Although it appears that ammonia may be fixed in a mixture of hot gases by means of sulphur acids, as in the Summerlee and Langloan processes, and the greater portion of the compounds may be removed with scant cooling and washing, yet we have no proof that all the ammonia is so recovered, and it is moreover plain that the recovery carried out in this way is accomplished with attendant detrimental effect on the quality of the tar and of the resulting combustible gas. On the other hand, the great power of water to absorb ammonia and other gases is well known, and has been variously stated by different authorities. Dr. Lunge states that 1 gramme of water, at 0° C. and atmospheric pressure, absorbs 1146 c.c. of ammonia gas. This action is, however, powerfully controlled by temperature. Similarly, the gaseous compounds of sulphur which are given off by the combustion of coal are readily absorbed by water if the temperature is suitable. Bloxam states that water absorbs about three times its volume of hydrogen sulphide at ordinary temperature.

It is thus apparent that the most complete and satisfactory means for the removal from producer gases of ammonia and tar in good condition, as well as sulphur vapours and the vapour of water, is to cool the gases apart from water to atmospheric temperature and then wash them with water. The tar is then easily separated from the liquors by gravity, and the ammonia is separated as gas from the watery solution, and then combined with uncontaminated sulphuric acid, so that pure sulphate can be obtained. As an example of the thoroughness with which this system acts, the following figures are given from atmospheric plant at blast-furnaces using Scotch bituminous coal. In the figures, the quantities of sulphur, ammonia, and tar are shown in the unwashed gas, and then in the same gas after it has passed through the condensing and scrubbing plant:—

	Green Gas per 100 Cubic Feet.	Washed Gas per 100 Cubic Feet.
Sulphur	52·0 grains	0·31 grains.
Ammonia	36·0 ,,	0·37 ,,
Tar	1003·3 ,,	trace.

In applying this system to producer gas, two things have to be provided for—viz., first, the higher temperature of the producer gas as compared with blast-furnace gas, and, secondly, the steam required to saturate the blast. The first is provided for by an adequate area of efficient cooling surface, and the second by a recuperative surface condenser, designed by the author in conjunction with Messrs. R. & J. Dempster, Limited, in which the heat of the gas is used to heat the blast and to produce a large volume of steam, which is carried off by the heated air. Proof of the capacity of the atmospheric system to deal with large quantities of ammonia is found in the result announced by Mr. Beilby, that, with his coal producers and the ordinary atmospheric condensing plant in use at the oil-works, as much as 134 lbs. of sulphate of ammonia per ton of coal has been recovered. This will show that the statement made, to the effect that the atmospheric system of plant is unsuitable for producer gases, is incorrect. It follows, from the foregoing facts, that the temperatures ruling in the Mond system of apparatus seriously militate against securing the best results.

American High-Pressure Water-Works.—One of the highest pressure water-works pumping-stations in the United States is situated in Morenci, Graham County, Arizona, and is owned by the Morenci Water Company. The water, which, according to "Engineering Record," is of excellent quality, is obtained from Eagle Creek, a small stream flowing through a deep cañon five miles from the town. The reservoir supplying the town is 1717 feet above the pumping-station. They are connected by a 6-inch standard steel pipe pressure main, laid on top of the ground over very rough country. The static head combined with the friction through the pipe requires a pressure of from 800 to 885 lbs. at the pumps. About 14 million gallons per month are pumped through this line. In laying the pipe, the ordinary sleeve connections were used; but extra-heavy faced flanges were employed where bends occurred. No expansion joints were found to be necessary, as the many bends in the pipe allow it to move freely. The power plant is of ordinary design, with Stirling boilers and a cross-compound condensing engine belt-driving four plunger-type power pumps. Texas oil is burned, and it is found that about 13 lbs. of oil will deliver 1000 gallons into the reservoir. The method of piping the oil to the pumping-station is perhaps unique. The oil is delivered from tank-cars in Morenci directly into a pressure tank. A 4-inch oil-line connects this tank with the oil-reservoir at the pumping-station. This oil-line is laid over a hill; the highest point being level with the water-reservoir supplying the town. Water from the town mains is turned into the bottom of the oil pressure-tank, and the oil is forced out and up over the hill, thence flowing by gravity to the pumping-station. On account of the difference in the specific gravity of the oil and water, the oil will rise to the level of the water reservoir, while the water in the oil-line will not. Hence when practically all the oil has passed over the hill, the flow stops automatically. It therefore requires no watching or operating except to fill the oil-tank and turn on the water pressure. The tank is drained of water each time before being filled again with oil.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

Meeting at Felixstowe.

SUNNY Felixstowe gave the members of the Eastern Counties Association a reception last Friday such as has not been in the past, or cannot possibly be in the future, exceeded by any town, however much there may be trial. Warm-hearted hosts were the Chairman (Mr. Samuel Alexander) and his colleagues on the Board of the Felixstowe Gas Company; and enthusiastic in the arrangements of the day was their Engineer and Manager (Mr. F. Paternoster). The weather—well it was such that one might, remembering the snow, the winds, and the low temperatures of a week before, have imagined, while in Felixstowe on May-day, that he had been transported to an altogether different clime. The Felix Hotel—a monument to the present-day prosperity of the town as a seaside resort—was the centre of the day's doings. There the Chairman and Directors of the Gas Company gave the visitors a bountiful welcome. At their invitation, the large party —consisting of some 65—had luncheon together. Mr. Alexander presided; and his fellow-Directors present were: Mr. E. H. Woodmancy, Vice-Chairman, Mr. Worthington Church, Mr. T. E. Priestman, and Mr. T. Ward. The seats of honour next the Chairman were occupied by Mr. Joseph Davis (Gravesend), the President of the Association, and the Rev. S. R. Cambie. Among the guests were Mr. A. J. Haward, Solicitor, and Mr. Napier Prentice, Engineer to the Felixstowe Electric Light Company. Mr. Paternoster was very active in looking after the comfort of the visitors. The luncheon was greatly enjoyed; most of the members having travelled a distance during the morning.

After the loyal toast had been honoured,

The CHAIRMAN said he wished to offer the visitors, on behalf of the Directors of the Company, a very cordial welcome to Felixstowe. The Directors felt that the members had conferred upon them a very great honour in coming there, because he believed their Company was the youngest represented in the Association. They had only recently completed their majority. The members were probably aware that Nature had blessed Felixstowe with a larger amount of sunshine than almost any town in the kingdom. If they examined a large board on the promenade, it would be found that in 1906 Felixstowe headed for sunshine the list of towns mentioned. Last year there were not the same number of hours of bright sunshine, but Felixstowe held its own. They might say, "Whatever has that to do with gas?" Their young Company were endeavouring to emulate the brilliancy of the sunshine by producing a light which was not surpassed by any other source of illumination. He trusted that during the visit of the members they would be favoured with such a specimen of sunny weather as would induce them to make Felixstowe their summer resort. He had great pleasure in welcoming the members on behalf of the Directors of the Company.

The PRESIDENT said they could not leave the table without thanking the Chairman and Directors of the Company for the cordial welcome they had accorded them. He should have been pleased if the Chairman had given them a little more of the history of the Company. There was no doubt a big future before Felixstowe. There was a beginning in all things. He had seen a few figures relating to the Company when it was very small; and he was happy to say that, though it was small, it was now growing larger every year; and there was every prospect that in a few years it would be double or treble its present size, which was about 34 or 35 millions. The character of the business was well exemplified by what was to be seen at the Company's splendid show-rooms. So far as the works were concerned, it would not be fair to criticize them; but he had no doubt, from his knowledge of the indomitable energy animating their Engineer, that when the Company got into new works, the undertaking would be even more prosperous. It was the members' earnest wish that it might always be a prosperous undertaking. He proposed, with much pleasure, the toast of "The Chairman and Directors of the Felixstowe Gas Company." Of all the towns they had been to, the members had never been better treated.

The VICE-CHAIRMAN, replying for his colleagues, said he did not expect the honour of having to acknowledge this toast; but he did so most sincerely. If it had given the members anything like the pleasure in being present that it had given the Directors to be the hosts of the Association, then he could say that the visit would be a most enjoyable one.

It was announced that Mr. Napier Prentice, the Electrical Engineer, would be pleased to receive at the electricity works anyone who would like to visit them after the meeting. A point of interest was that the electricity was generated by gas-engines.

The members afterwards assembled on the beautiful lawn of the hotel, and were photographed in a group.

The Business Meeting was subsequently held—the PRESIDENT (Mr. Joseph Davis) in the chair.

THE PRESIDENT'S MEDAL.

The HON. SECRETARY (Mr. T. A. Guyatt) read the minutes of the meeting held at Gravesend on Sept. 26 last.

Mr. R. G. SHADBOLT (Grantham) asked, as a matter arising out of the minutes, what had been done with respect to the President's Medal.

The PRESIDENT said the Committee had had designs presented to them for a medal; and they had chosen one which would be open for inspection. It was proposed to get the medal struck, and make it retrospective so far as the immediate Past-President was concerned. He took it the medal would be presented at the September meeting.

Mr. H. WIMHURST (Sleaford) said, unfortunately, he was compelled to be absent from the last meeting; and he now wished to strongly object to the resolution regarding the President's medal as then passed. If they desired to present the Presidents with a medal, he thought they should go back to the beginning—to those gentlemen who worked for the Association from its inception, and had been through the chair. Those who started the Association in 1888 for some years entirely paid their own expenses, and gave their time freely to the formation and working of the organization. And he did think, if they were going to carry out this idea, that it was due to many of those who worked with him at that time that they should also have the honour of receiving the medal at the hands of the Committee.

The PRESIDENT remarked that, so far as he was concerned, this was a somewhat delicate matter. The Committee had been discussing the question raised by Mr. Wimhurst, as, from what he (the President) had heard outside, the Past-Presidents would also like to receive a similar recognition. But, most unfortunately, the finances of the Association were such that Mr. Wimhurst's proposal would absorb the whole of the funds; and rather than this should be done, personally he would retire from the recognition unless or until the members again wished it.

Mr. WIMHURST asked the cost of the medals.

The PRESIDENT: 40s. each.

Mr. WIMHURST said there were fourteen Past-Presidents on the list. That number would absorb £28. They had the money-making machine, and an increasing number of members. He thought the Association could afford the sum named. He therefore proposed that the living Past-Presidents should have the honour of each receiving a medal from the Association.

Mr. G. R. CASTERTON (Melton Mowbray) seconded the motion, which was carried; but several members refrained from voting.

The minutes were then confirmed.

ANNUAL REPORT AND ACCOUNTS.

The HON. SECRETARY presented the Committee's annual report and the accounts; and on the proposition of Mr. SHADBOLT, seconded by Mr. PATERNOSTER, they were taken as read. The report contained, among others, the following paragraphs:

The year commenced with a membership of 92. The Committee very much regret to record the death of Mr. H. B. Chamberlain, who had been a member of the Association since 1901. Two members resigned; and eight new members were elected—making a total membership at the end of the year of 97.

The accounts show that a balance of £40 12s. 2d. was brought forward; and subscriptions paid during the year amounted to £45 3s.—making a total of £85 15s. 2d.

The expenditure was £54 4s. 9d., which leaves a balance of £31 10s. 5d., and twelve subscriptions outstanding.

The Commercial Sections, which were inaugurated two years ago, have held regular meetings during the year, and have proved very beneficial. The subjects discussed have covered a wide range, and a large amount of useful information has been exchanged among the members. Several new members have joined; and the reports are of a very encouraging nature.

NEW MEMBER.

The HON. SECRETARY announced that Mr. George Helps, of Nuneaton, had been nominated for membership by Mr. W. D. HELPS, seconded by Mr. JOHN CARTER (Lincoln).

The nomination was confirmed.

RETORT-HOUSE WORKING FOR SMALL WORKS.

Mr. F. PATERNOSTER read a paper on this subject, which resulted in an excellent discussion. The paper and the report of the discussion appear on pp. 290-94.

ELECTION OF OFFICE-BEARERS.

The PRESIDENT proposed that Mr. C. F. Ruggles (Leighton Buzzard), the Vice-President, be elected his successor in the chair.

Mr. J. H. TROUGHTON (Newmarket) seconded the motion, which was heartily agreed to.

Mr. RUGGLES said he thanked the members very much for placing him in such an honourable position; and he hoped he should be able to carry out the duties in a way satisfactory to the members.

Mr. SHADBOLT moved that Mr. John Young be elected Vice-President. He, like Mr. Ruggles, was a good man and true.

Mr. F. PRENTICE (Ipswich) seconded the motion, remarking that to know Mr. Young was to like him, if not to admire him.

The motion was cordially endorsed.

Mr, YOUNG thanked the members most sincerely for the honour done him. He had had some diffidence in giving a promise to

accept the position, because he was only anxious for the welfare of the Association; but if the members thought he would be able to forward its interests, he was grateful to them for conferring the honour upon him.

Mr. RUGGLES said he had much pleasure in proposing the re-election of the Hon. Secretary and Treasurer (Mr. T. A. Guyatt). They knew the arduous duties of Hon. Secretary; and they were fully aware of what an amount of excellent work and heart Mr. Guyatt put into the Association.

Mr. H. DUESBURY (Hertford) seconded the motion, which was cordially agreed to.

The HON. SECRETARY having made acknowledgment of this evidence of continued confidence,

On the proposition of Mr. W. D. CHILD, seconded by Mr. C. G. GRIMWOOD (Sudbury), Mr. J. West, of Stamford, and Mr. Prentice were appointed members of the Committee.

Moved by Mr. T. GLOVER, and seconded by Mr. J. WITTEN, the Auditors (Messrs. H. Wimhurst and T. Dann) were reappointed.

PLACE OF NEXT MEETING.

Mr. RUGGLES invited the members to hold their September meeting at Leighton Buzzard. His Directors, he said, would be very pleased to see the members. It was four years since the Association met there; and it was high time they paid the town another visit.

Mr. JOHN YOUNG seconded; and the invitation was heartily accepted.

A VOTE OF THANKS.

Mr. JOHN CARTER (Lincoln) moved a vote of thanks to the President and the officers for their services during the past year. He remarked that the prophecies that were so freely indulged in when Mr. Davies was nominated to the post of President had been completely realized; and he had proved himself in every way a President fitted to follow those who had gone before, and to maintain the best traditions of what was, after all, the highest position the members were able to confer upon any one of their members.

Mr. E. W. SMITH (Chelmsford) seconded the motion, which was cordially passed.

The PRESIDENT said he sincerely thanked both the proposer and the seconder of the vote of thanks, and also the members for the cordial way in which they had supported it. So far as the officers were concerned, he observed that they were only too anxious and willing to do all they could for the good of the Association. As to his successor in the chair, he should be happy to render him any support he could during his year of office.

REPRESENTATION ON THE COUNCIL OF THE INSTITUTION.

The PRESIDENT, referring to his representation of the Association on the Council of the Institution, said the Council had nominated him as an ordinary member, which, as the members of the Association knew, continued for three years. He had accepted this; and therefore it was necessary to elect a district member in his stead. He suggested that Mr. Brockway should be elected for the third time. Then he would have served three years.

Mr. SHADBOLT seconded the motion, which was unanimously agreed to.

This concluded the business proceedings.

THE DINNER.

The dinner in the evening was attended by 64 members and friends, including four Directors of the Felixstowe Gas Company —Messrs. Woodmancy (the Vice-Chairman), Ward, Priestman, and Church—and a number of local gentlemen. The toast list was interspersed by excellently rendered songs and recitations. The usual loyal toast was submitted by the President. Then Mr. Woodmancy proposed the toast of the evening, "Success to the Eastern Counties Gas Managers' Association;" and, in doing so, he showed a keen appreciation of the beneficial work of the organization. The President, in a racy speech, responded, evoking much laughter by a humorous comparison of the duties and knowledge of gas matters of respectively directors and their executive officials. With his usual geniality, Mr. Ruggles (the President-elect) submitted the toast of the "Felixstowe Gas Company," to which response was made by Mr. Woodmancy and Mr. Priestman—the latter gentleman, in the course of his remarks, mentioning that he and Mr. Ward were the only two survivors of the original Board. In a charming little speech, Mr. John Young (Vice-President) gave "The Town and Trade of Felixstowe," to which Mr. F. S. Bennett and Dr. Horton replied. "Kindred Associations" was proposed by Mr. John Carter, and replied to by the Senior Vice-President of the Institution (Mr. T. Glover). "The President" was submitted by Mr. F. Paternoster; and the "Hon. Secretary" by Mr. H. Wimhurst. All the toasts were enthusiastically honoured.

A PLEASANT OUTING.

The following day, a party of about forty, including several ladies, drove to Orwell Castle, the seat of Mr. Prettyman, who had kindly invited the party to view the Castle and grounds. Only a short time was available for this; and the return to Felixstowe brought the meeting to a close. The weather remained fine; and the drive was very enjoyable. Several of the visitors took the opportunity of spending the week-end in Felixstowe.

SOUTH-EAST OF IRELAND GAS ASSOCIATION.

Quarterly Meeting at Fermoy.

A good muster of members of the Association attended the above meeting, which was held in Fermoy last Thursday, and spent a profitable and interesting day at the home and works of their President, Mr. D. W. TOOMS. After a visit to the works, where a recently built gasholder, new offices and show-room, and retort-house were critically examined, the members adjourned for luncheon, provided by the Fermoy Gas Company.

At the conclusion of luncheon, the business meeting was held. At the invitation of Mr. G. W. Norman, it was arranged that the next meeting should be held in Dublin, on the Saturday preceding that of the Irish Association at Holywood.

The PRESIDENT delivered the following

INAUGURAL ADDRESS.

Gentlemen,—My first duty is to formally thank you for electing me as your President; and in so doing, I must congratulate the Association on the sustained interest and enthusiasm with which the members are imbued—to the mutual advantage of members and the concerns for which they are responsible. I think most of the advantage which we undoubtedly derive is due to the fact that our meetings are less formal than those of the larger Associations; and in consequence we get freer discussions.

I sometimes think it does one good to take a backward glance at our industry. Seeing therefrom what has been accomplished during the past twenty years, enables one to face the future with a heart-and-a-half. The phases our industry has undergone have been both varied and interesting. When the electric light began to make its appearance as a competitor of coal gas, things looked gloomy. But our star was still in the ascendant; and instead of "giving up the ghost," as was prophesied, the competition proved the salvation of the gas industry. The old-fashioned lackadaisical methods of doing business were discarded, and enterprise became the watchword of the gas manager. The impetus thus given, together with the advent of the Welsbach mantle, has resulted in progress all along the line; and to-day it is an excellent tonic for a gas manager with a "fit of the blues" to examine the market quotations of gas stocks.

Well, I am of opinion that Associations of Gas Managers, with the exchanging of views, have played a goodly part in bringing about this happy state of affairs. They enable us to get away from ourselves, so to speak, and avoid those dangerous obstacles "grooves;" and though comparisons can be, and sometimes are, carried too far, there is no doubt that comparing our works with others enables us to effect many improvements. A manager who neglects attending these meetings, is not up to date. The time and money spent in doing so are amply repaid in the "wrinkles" and new ideas one is able to pick up in talking "shop."

It will doubtless be of interest to members inspecting my works if I briefly describe some alterations and extensions that have been carried out. The works are situated in a low-lying position, and in the past have been periodically visited by floods, owing to the river overflowing its banks; and the town has more than once been plunged, not only in water, but also into darkness. To get over this unpleasant state of affairs, the works plant has been gradually raised; and it will be noticed that the whole of our plant, with the exception of the engine-room, has been built on concrete foundations raised about 3 feet above the old yard level. This work has been carried out as opportunity offered, until now all the plant that would be affected by floods is raised above the level of any previous flood known; and the state of the river does not give us the same concern as hitherto.

In Christmas week, 1906, I had a very unpleasant experience with a gasholder. My total storage being less than one-half the maximum day's demand, any difficulty with holders in winter-time was of serious consequence to me. The holder in question —a two-lift one, containing 20,000 cubic feet—was full about dusk on Dec. 20, and to all appearances in perfect order, when, without warning, it uncupped. I examined the cup and grip; but everything seemed in order, so I commenced to raise the bottom lift. It was noticed that, though this cupped all right, it immediately began to get out of level; and the higher it went, the worse it became. I eventually found the reason to be that the bottom curb had parted from the sheeting for half the circumference, and was supported from the half holding good—the remainder hanging down. This weight being concentrated to one side of the holder, threw it out of level, with the result stated. To remedy this state of affairs, I procured some ten lengths of bar iron, 3 in. by $\frac{1}{2}$ in., made into clamps, one end of which was passed under the curb, and the other end over the grip. I wedged these on tight, and filled the holder again, and examined it, when it was found that the bottom sheet was corroded away. I then took about fifteen light iron straps, $1\frac{1}{2}$ in. by $\frac{1}{4}$ in., one end of which was bent to catch the curb, and the other end carried about 18 inches up the side plates, and securely bolted to the plates. This made a very good job, and enabled me to survive Christmas without having to cut pressures.

It was then decided to push forward with the erection of a new gasholder, which was commenced in April, 1907, and brought into action in March last. The tank, which was built by ourselves, is of reinforced concrete rendered on the inside. It is 65 ft. 6 in. in diameter, by 16 ft. 3 in. deep, with three landing

blocks and ten piers. The walls are 18 inches thick, strengthened by steel bars bent to the radius and hooked into each other to form an unbroken ring. These bars range from 3¾ in. by ⅝ in. at the bottom to ⅜ in. by $\frac{3}{16}$ in. at the top. No dumpling was left in; the floor being level. The holder not being trussed, a timber stage was erected to carry the crown when the holder is at rest; and this is held down by a concrete lump being built around its legs 3 ft. 6 in. high. The top of the tank is carried 4 feet above the yard level, to avoid wet foundations. The holder is a single lift one; but provision is made for adding two more lifts as required. The columns, which are 25 feet high, will, when added to, again suffice for the three lifts. The cost of constructing the tank was somewhat increased owing to the wet summer we had last year. The total was £687 2s. 8d., which covers everything in labour, material, and tools, and also the filling with water, which had to be pumped by hand.

We are also just about completely reconstructing our offices, (which, if not palatial, are very roomy and comfortable) and the fitting up of a show-room—a special addition which is nowadays a very necessary adjunct to a gas undertaking, and from which we expect to derive a considerable benefit in the future. We are also adding meter and governor houses at the end (which are not yet commenced); and, when this is done, I think Fermoy will have a gas-works as well equipped as one could wish.

I purpose confining my remaining remarks to coal, coke, and carbonizing, and invite your discussion thereon. The price of coal is, though not so high as a year ago, still at a very big figure, and shows no immediate sign of coming down; and I have been wondering if we are now buying to the best advantage. Coal, whether of good or bad quality, costs the same for freight. Some works I know are able to show the excellent return of over 12,000 cubic feet per ton, with a coke sale of about 11 cwt. per ton of coal carbonized. On looking into these cases, it will invariably be found that the reason is not the super-excellence of results, but rather the quality of the coal used.

The coal I have been employing for the past five or six years shows, on a laboratory test as given by the colliery proprietors, 10,800 cubic feet of 16-candle power gas and 70 per cent. of coke, out of which I have, with generator settings (no recuperation), made as an average 10,000 cubic feet of gas, with a coke sale of 9·5 cwt. Some time ago, I received a sample truck of a higher-class coal, which I tested, and obtained 12,700 cubic feet of gas and 14 cwt. of coke. Thus, assuming the coke to be the same as from the coal in ordinary use, and that I averaged 12,000 cubic feet of gas per ton, this coal would be worth between 4s. and 5s. per ton more than that in use, without taking into consideration the saving in wages and reduced wear and tear, which would be considerable when it is borne in mind that we should use 20 per cent. less coal per year. In fact, it would often mean dispensing with a bed of retorts. Of course, it may be there are other drawbacks to the use of this high-class coal in small works; but I feel that the only point we have to concern ourselves with is the difference in cost of the respective coals in our works, and the difference in value of returns to be obtained from them. On this basis, I think we should at any rate have an extended trial of a good class coal.

There has been a fairly good demand for coke during the past year; and it behoves us to be on the *qui vive* for increasing the amount of coke for sale per ton of coal carbonized. Tar, being such a drug on the market, would appear to be the fuel we should use to replace the coke employed for heating retorts. To do this, however, in the orthodox manner necessitates having a setting specially constructed for tar burning; and if it could be successfully used in ordinary generators (so that we could burn coke and tar, or coke alone), it would be a boon indeed. Some time ago, I experimented with burning tar in my producer, but was not able to go far enough to say it was satisfactory, owing to the gas storage being defective. Anything going wrong, and causing the heats to fall, necessitated my immediately shutting off the tar, and jumping about to get the stock up again. My chief difficulty was in the coke caking into one mass, and preventing air getting through; and when this trouble is overcome, the remainder will be comparatively easy sailing. I was also troubled with deposition of lamp-black in the flues; but this I did not mind, as I was able to get at them fairly easily. I shall, in my future experiments, have a far better chance of success than hitherto, as I shall not be so pinched for gas. The reason for bringing this before you was to endeavour to get information; and I trust to derive some help from the discussion.

As to our methods of selling coke, we have a choice of three ways: (1) By selling all out of the yard; (2) by selling all to a contractor; (3) by retailing, and selling our surplus to a contractor. We can, I think, dismiss the first without remark. No. 2 has its good points, and also its drawbacks. Selling all to a contractor is a very comfortable way of working, providing we get a fair price. It enables us to keep our yards clear; and by avoiding the turn of the scale in selling in ½ cwts., I have no doubt we escape losing a good deal of coke. But the contractor finds he can get a better price up-country, with the result that the connection which the gas-works has worked up is allowed to dwindle, and is eventually lost, so that when we cannot make a favourable contract, and commence retailing again, we find our sales are *nil*, and our stock accumulates to alarming proportions, until we are able to create a demand. This will take about two years, and is only done by hard work and expense in hawking, advertising, and cutting prices. The contractor meanwhile supplies some of the customers he has taken from us from his stock; and besides this, our coke is depreciating very rapidly. I think I am not far out in saying that 25 per cent. of coke per annum will be turned into breeze and unsaleable.

By far the better method is to keep our own connection, and contract for the disposal of our surplus, as we are then to a large extent independent of the contractor. We get for our surplus about the same as if we sold the whole; and the extra price obtained by retailing more than pays us for the trouble and expense of doing so. But the chief advantage is that our own connection is constantly increasing while under our care; and thus we are not only obtaining a better price for our coke, but every year are getting more independent of outside buyers.

I believe there is still some diversity of opinion as to the merits of under-fired as against outside-fired generator settings. But I cannot understand anyone who has used the outside producer favouring the under-fired plan. The advantages of the outside producer over the under-fired system are real, and the disadvantages theoretical. I have both kinds of settings in use regularly in my town—viz., outside producers at the town works, and the under-fired method at the barracks works—and the difference in working is very noticeable. Clinkering, which is the most arduous task in a gas-works, is accomplished with comparative ease and comfort in the case of the outside producer; but with the under-fired setting, and the accompanying pit, it is a great trouble. And on this work being done well, rests to a large extent the success or otherwise of the setting. There is also the great advantage of the reservoir of coke we are able to have by means of the curtain, which in my case allows of firing the producer every six hours, and still having a constant depth of fuel, and therefore a more constant quality of gas. In the case of the under-fired setting, the reservoir is *minus;* and the quality of the producer gas made must vary within wide limits, according to the periods of firing. Also the rush of cold air getting into the bed when the furnace is fired cools the setting; and this means more coke to make up the loss.

There is another point I might mention. It is very essential that primary air should be admitted under the bottom of the fire-bars, and not in front, which we keep breezed-up and wet. This breeze often gets deranged through the water being off for a time, or the pipe becoming choked, &c. If left open, it will allow the primary air to get up the front of the producer; and very soon clinker will be formed, which will not be seen when clinkering, and will quickly grow until the heats are affected, and a thorough examination reveals the defect. This can only occur, in the case of outside producers, through carelessness of the stokers, as the clinkering-door is always under their eyes; but, in the case of under-fired settings, it is in a covered pit, and only examined (say) every shift. Personally, if my heats fail at the barracks works, the first thing I look to is this point.

Another advantage of the outside producer is that the furnace being separate from the setting enables us to have a larger combustion chamber, and thus a better mixing of the carbonic oxide and secondary air and slower travel. The result is very greatly diminished wear and tear—cutting heats being impossible, no matter how high the temperature at which we are working. To illustrate this, I would draw your attention to my No. 1 setting of six retorts, which is at present in action, and can be examined. This has now been working just under a thousand days, and the shape of the retorts is perfect, and the combustion chamber as clean as the day it was first fired, and this notwithstanding that the bed has been subjected to hard treatment—viz., much hanging fire, working with heats producing from less than 3000 to more than 7000 cubic feet per mouthpiece (retorts 21 in. by 15 in. by 9 ft. 8 in.), and often, if stock has got low, jumping within six hours from the low to the high make mentioned above. The only disadvantage I have heard against the outside producer is that it loses heat by radiation, which in the case of the under-fired system is absorbed by the setting. My reply to this is that it is a theoretical disadvantage, and in practice it is found that the loss is quite negligible. I have, when working at anything like the capacity of my beds, no difficulty in getting 10,000 cubic feet of gas, with a coke sale of 10 cwt. per ton; and it should be borne in mind that this is without recuperation.

My beds are, for obvious reasons, working at a very low efficiency just now; but under more favourable conditions, I have averaged this for a whole year. Owing to the unfortunate deadlock in Fermoy during the past 4½ years, we have not been able to extend our business. On the other hand, we have been threatened with competition from various sources, which it is gratifying to know has made very little headway, notwithstanding the disadvantage we have been labouring under; and the reason of this is, I think, the fact that ever since my advent into Fermoy I have advocated as strongly as I could the use of the most economical burners commensurate with efficiency. I have reduced a good many customers' accounts by upwards of 50 per cent., to their great satisfaction.

Discussion.

Mr. G. Lennon (Dungarvan) said that he had used an external producer for some time, and had concluded that it was not an unmixed blessing. While recognizing its many advantages in convenience, and especially for clinkering operations, he had not attained any very extraordinary carbonizing results, such as he had heard some of the members mention. About 8½ cwt. per ton of coal carbonized were his coke-sale figures over the year,

with a make of well on 11,000 cubic feet of gas from good Yorkshire Silkstone coal; and he saw no immediate prospects of any great improvement in so small a works as his. He considered the tunnel at the back of the settings a distinct disadvantage, and in any future settings he erected he would arrange it in front. Also, it was not the easiest thing in the world to avoid explosions in adjoining settings, where two or more drew their fuel gas from the same producer. He had experienced one or two slight explosions—not serious, certainly; but nevertheless there existed the ever-present possibility of the luting material on the tiles covering the gas ports becoming dry or disturbed by expansion and contraction of the bench itself.

Mr. T. Hornby (Mallow) thought that, although a high-grade coal might considerably reduce the number of settings in use, and the consequent labour involved, in a large works, managers of small ones had to be influenced by standing-off charges and the carbonizing units employed. It might be sounder policy to buy a lower grade of coal, especially in summer, and so keep the plant better employed by reason of the lessened wear and tear through damping-down and pulling up the heats again. On the matter of coke sales, he preferred handling as much retail trade as possible, and disposing of any surplus to contractors. He had used an external producer with a setting of seven retorts all last winter. Whether it was that the carbonizing unit was too large (he was never called upon to exceed 4000 cubic feet per mouthpiece) and the work too light for the producer, he was not prepared to say, but his tests of producer gas were very bad, while his coke sales per ton of coal carbonized would average probably 8 cwt. on a make of 10,500 cubic feet or thereabouts from a good coal. He was of opinion that the economy of external producers had its limit in small works, where, owing to the increased radiation from so many sides being exposed to the atmosphere, the same temperature could not be maintained in the incandescent fuel as in an internal producer. Heavier work was therefore required to maintain the temperature necessary to reduce the carbonic acid to carbonic oxide; and this, of course, could only be obtained in large works.

Mr. J. G. Tooms (Waterford) acquiesced in the President's opinion in regard to buying a high-grade coal, especially where freights were high. He quoted from Mr. Allan's paper at the meeting of the North of England Association (see *ante*, p. 220) showing the increased make of gas per ton from the same coal by means of increased heats; thereby reducing the number of retorts required, with the consequent economy of labour. Referring to his eight years' intimate use of external producers, each producer heating two settings of eight retorts each, he said he was in accord with the President in his admiration of them, though he was not prepared to admit that they possessed all the virtues the President had claimed. Nor would he agree that the results were relative, irrespective of the size of the works or the carbonizing units fixed. Large works, which were able to run two or more settings off a producer, were getting higher results than smaller ones with stand-off allowances to make. He might point out that the curtain was not peculiar to, or monopolized by, an external producer, as such curtains were in use in internal producers at Edinburgh, Grantham, Stalybridge, and elsewhere. He also took exception to the President's inference that cutting heats were peculiar to internal producers. These heats were applicable by any producer or furnace, and were purely details in the working. He might mention some new benches now being built in Waterford, where the gas-tunnel was being placed in front of the benches; thereby facilitating blocking-off operations for each setting, and also cleaning-out operations. The furnace design was also somewhat altered. His own carbonizing results were very satisfactory; and he was perfectly satisfied with the behaviour of his external producers. But whether he would be so enthusiastic if he had not water-logged foundations was quite an open question.

Mr. J. Grant (Tipperary) said he had had experience of each class of producer, and was perfectly satisfied with them. He claimed reasonably good results from both, and expressed the opinion that the choice of the producer to adopt turned purely upon local conditions.

Mr. J. Carter (Dublin) thanked the President for the pleasure he had experienced in listening to his address. What appealed to him was the similarity of the methods adopted in gas managers' producers for ensuring efficiency and economy, and those in his suction-gas producer, on which he was to speak later.

Mr. R. Bruce Anderson (London) thought, in reference to coke sales, that a retail trade, either from the gas-works direct or by cart, should be cultivated, and the surplus coke sold for what it would bring. He sometimes wondered whether it was worth while troubling about the retail business in small works, on account of the labour involved; but where no additional labour was necessary—where the stoker, the lamplighter, or the yardman could handle the small sales along with his ordinary work—he advocated cultivating local direct coke sales. On the question of external as compared with internal producers, he anticipated there would always be a diversity of opinion as to their relative merits. External producers were peculiarly adaptable to water-logged foundations; and in small works they saved stage-flooring the retort-house, which was always a very heavy item of expenditure. The radiation from an external producer was certainly a real, not a theoretical, loss; and his later designs of furnace were now provided with a reduced grate area, with the idea of maintaining a higher temperature in the furnace. His last installation was a setting of retorts and a producer side by side in one arch—thus preventing much radiation. With regard to high and low grade coal, the difficulty was to get a proportionate price. Higher freights were charged, both inland and at ports, on high-grade coal; the cost from the Mersey to their east and south-east towns being nearly as high as from the Tyne, while loading facilities at the latter place were superior.

Mr. J. Paterson (Queenstown) thought managers of small gas-works could not value too highly the great benefit to be derived from informal meetings such as the present. He considered the President's carbonizing results, the appearance of his retorts which they had all seen that day, and his freedom from cutting heats, as observed in his combustion chamber, were very creditable records; but he (Mr. Paterson) objected to all this credit being placed to the use of outside producers. Speaking personally, he had one of his settings that had worked continuously (with the exception of fourteen days' break) for 1350 days, and not a single repair had been done to his furnace, which, by the way, was an internal one. A recent "push" test on a good coal gave 8000 cubic feet per mouthpiece, and 12,000 cubic feet per ton; while his average carbonizing results for the year were 11,000 cubic feet of gas, and his coke sales were 10·5 cwt. per ton. They would hardly be surprised that he was not a convert to external producers; nor did he suffer any inconvenience from his internal producer being in a pit. Clinkering operations were a minus quantity with him, and were only carried out every 48 hours. He attributed this to his arrangement for the admission of the primary air, which was carried along the cheeks of the ashpan walls, and delivered from ports in the back wall. He had a jet of steam at the opening for the primary air. He considered outside producers unsuitable for small works, and would not dream of installing them in works such as theirs, except under very special circumstances. Regarding coke sales, he objected to sales in bulk to contractors, though they had the advantage of saving the turn of the scales so often, and kept one's yard clear; but he preferred cultivating local retail sales as much as possible.

Mr. W. H. Apted (Carrick-on-Suir) said he had been using an external producer during the past winter, and, so far, had not seen any very greatly improved carbonizing results compared with those obtained with his old settings. He was of opinion that they were unsuitable for small works; but in large ones, where constant and forced demands could be maintained on the producer, the results were as good as, but he would not say better than, those obtained with internal producers. He cultivated a retail coke trade himself.

Mr. J. F. Tyndall (Wicklow) expressed the opinion that discussions like that in which the members were engaged would be better for some little thought and preparation; and he regretted that the address they were considering was not in print a few days before the meeting. He had recently paid some considerable attention to the merits of external producers, and in the past winter he had worked two separate producers and two separate settings. His opinion so far was in entire accord with that of Mr. Paterson; and he spoke from experience of direct-fired, semi-generator, internal fired, and external producers. Perhaps he was expecting too much from the latter, for he heard great reports of big sales of coke per ton, and so forth; but he had concluded that, for many reasons, the results obtained from small works were not in relative proportion to those from larger ones. The carbonizing unit was an important matter in relation to an external producer; for, if there were many stand-off charges, either the wear and tear of the setting was excessive, or in trying to save this, the temperatures were so reduced in the producer that a weak fuel gas was the result, though surely enough coke was burned. Three factors were important in a successful generator—viz., (1) temperature, (2) depth of fuel, and (3) velocity of air through the producer. The last depended on grate area, and the second was a detail in design; but the first was influenced by several conditions. They were all aware of those which were necessary in a generator to obtain a good fuel gas. He here joined issue with the President when he airily dismissed, as negligible, the objections to loss by radiation in an outside producer. Did the President seriously tell them that an external producer, exposed on four sides to the atmosphere, did not lose severely by radiation? If so, he (Mr. Tyndall) was afraid many sceptics were surrounding him. The radiation was very real; and this was why it was only in the larger works, where a number of settings were pulling off one producer, or where reasonable work was found for the producer, that the necessary temperature was maintained to reduce the carbonic acid to carbonic oxide, and therefore get good fuel gas. On the other hand, an internal producer was surrounded on four sides by hot furnace gases, and hot coke could be fed into it. Therefore the furnace could be worked at much lower power with a good fuel gas. In a 5¼ million works, he had maintained an average make per ton of 10,000 cubic feet of gas, and sold 9·1 cwt. of coke, over five winter months, from a semi-generator; while over a whole year, using a mongrel direct-fired furnace for seven of the months, the coke sold was 8·8 cwt. per ton of coal carbonized. In a 4¾ million gas-works, with practically direct-fired settings, he had sold 6·52 cwt. of coke; while with outside producers he made 10,700 cubic feet of gas per ton, and just maintained an average coke sale of slightly over 8 cwt. He was working under the disadvantage of carbonizing units much too large for present requirements, and a holder storage of 21,000 cubic feet, with a maximum daily output of 38,000 cubic feet; but perhaps with increased consumption, and an additional holder now going in,

better results would soon be forthcoming. He apologized for the rather disjointed manner in which he had placed his remarks before the members. He had not known previously that this matter would have been under discussion, or else he would have brought some tests of producer and waste gas, and a modification of the furnace design which he had been allowed to carry out, showing a means of securing and maintaining a sufficient temperature in the external producer, even on low loads, so as to better reduce the carbonic acid first formed. One fact stood out regarding these outside producers—viz., that very few gas-works, large or small, had taken them up. Where this had been done, it would be found that it was in only the largest works; and special steel mains were provided to carry away the fuel gas. In the settings under consideration, brick tunnels were employed; and he defied any man to prevent air being drawn in somewhere in the length, and destroying the quality by burning the gas there instead of in the setting. He rather favoured some form of tube arrangement for the fuel gas, similar to Dempster's regenerator tubes.

The PRESIDENT, in replying to the remarks made, acknowledged the hearty manner in which his address had been received. He said the speakers had not altered his faith in external producers, though he admitted that the size of the carbonizing units had much to do with the economical working of the producer.

SUCTION GAS-PRODUCER PLANTS.

Mr. J. CARTER (Dublin) then followed with a paper on the above subject, aided by a fine model of a plant and several drawings. The paper was well received; its principal object being to arouse the gas managers of the country to cultivate their sales of coke, in place of anthracite, to users of producer gas.

Owing to the necessity for the preparation of diagrams, the paper, together with the report of the discussion upon it, is unavoidably held over till next week. At its close, Mr. Carter was heartily thanked for his paper and the trouble he had taken in connection with it; an additional compliment being paid to him by the members instructing their Secretary (Mr. J. F. Tyndall, of Wicklow) to have copies printed in pamphlet form and distributed to them.

A hearty vote of thanks was accorded to the President for his able conduct of the meeting and for his kindly entertainment of the members, and the proceedings terminated.

Institution of Civil Engineers.—At the annual general meeting of the Institution last Tuesday, the result of the ballot for the election of officers was declared. The new President is Mr. J. C. Inglis; and the Vice-Presidents are Mr. W. R. Galbraith, Mr. G. H. Hill, Mr. A. Siemens, and Mr. W. C. Unwin. Among the Members of Council elected are Mr. W. B. Bryan (the Chief Engineer of the Metropolitan Water Board), Colonel R. E. B. Crompton, C.B., Dr. G. F. Deacon, Mr. Walter Hunter, and Sir George Livesey. This Council take office the first Tuesday in November.

Wales and Monmouthshire District Institution of Gas Engineers and Managers.—The Institution will meet to-morrow morning in the Gas Offices, Bute Terrace, Cardiff, when the chair will be taken by the President, Mr. Edward Jones. The *agenda* includes, beyond the formal business and election of officers, a proposed alteration of Rule 8, so as to change the September meeting from the first Wednesday in the month to the last; discussion of the paper submitted by Mr. J. H. Canning at the last meeting, entitled "Some Notes on the New Electric Lamps;" and the reading and discussion of a paper by Mr. A. J. Ward (the Manager of the Cardiff Railway Company's Gas-Works), on "High-Pressure Incandescent Lighting at the Queen Alexandra Dock, Cardiff." Lunch will be provided by the Cardiff Gas Company; and thereafter the members will leave for the Grangetown Gas-Works, over which they will be conducted by Mr. Henry Morley, the Engineer and Manager.

Manufacture of Wooden Pipes.—We learn from the "Ironmonger" that works for the production of wood or stave pipes have been established at Hokitika, on the west coast of New Zealand. Mr. M. M. Griffiths, who has had much experience in stave-pipe making, has been brought from Canada to erect and manage the works. The timber as obtained from the sawmills in lengths of from 7 to 20 feet and 4 in. by 7½ in., is carefully selected—all slabs having knots or flaws being discarded. The wood is then placed for four or five days on a kiln heated to from 110° to 130° Fahr. After being properly dried in this way, it is cut into the required lengths by a swing circular saw, and put through a planing-machine, which dresses the surface, gives the edges the proper bevel, and adds the requisite tongues and grooves. The staves are then assembled round a core and given the shape of a pipe. A wrapping-machine capable of exerting enormous pressure binds them round with thick galvanized wire as tightly as may be required. Next comes a heading-machine, which puts on a collar or tenon—this coupling being rammed home with a steam-press. Then the pipe passes into a bath of Trinidad pitch and tar kept at boiling-point by a steam-coil, and after being creosoted in this way is rolled on a sawdust bed, the chief purpose of which is to make it easy to handle. The timber used is silver pine, which has great staying power under such conditions. The finished pipes vary in length from 4 feet upwards.

HIGH TEMPERATURE CARBONIZATION.

In the last number of the "JOURNAL" (p. 220), we gave the paper, entitled "A Few Practical Notes on High Temperature Carbonization," read by Mr. Alex. Allan, of Scarborough, at the meeting of the North of England Gas Managers' Association on the 25th ult. The following is a report of the discussion to which it gave rise.

The PRESIDENT (Mr. H. Wilkinson, of Harrogate) congratulated the author upon his paper, as also upon having achieved what had been a great success in carbonizing results.

Mr. C. DRU DRURY (Sunderland) thought the paper came at a most appropriate time, when the whole principle of carbonizing coal was on the point of being reconsidered; and any information with regard to the working of horizontal retorts which gave, or showed, a possibility of obtaining a larger make of gas from them, was of interest to them all. Without saying that carbonizing plant was likely to be turned upside down, there certainly seemed to be a distinct tendency at the present time to set horizontal retorts vertically. Most of them envied the figures Mr. Allan had obtained at Scarborough. He thought Scarborough might be said to hold the blue ribbon in the carbonizing field; but, at the same time, it seemed rather tantalizing that Mr. Allan omitted to give them the details of the operations which would enable them to follow in his steps. This would make all the difference to them when they were attempting to obtain these high yields of gas. Mr. Allan said they had to work carefully. A little enlightenment as to what careful working meant would be very beneficial to many of them, and to himself personally. He certainly, whenever he attempted to exceed what they usually obtained per ton of coal, had at once got into trouble of a very grave character. He should like to know whether Mr. Allan worked with a seal or with a dry main; and if with the latter, how he managed his vacuum. They knew that Klönne settings gave good results, and that they could attain high temperatures with them. A great many years ago, when he was a pupil in his profession, he saw the first Klönne setting erected in London. A German came over to show them how to start it; but one night unfortunately they melted down the whole setting. Of course, they had had other experiences since then. He imagined that those high results could be purchased at a very high cost; and he would like Mr. Allan to say what was the life of the retorts, and what the fuel cost. He could also imagine there would be a great deal of trouble from naphthalene; but he supposed that the percentage of carburetted water gas would remove this. Without wishing at all to disparage the value of the paper, it seemed to him that there were one or two discrepancies in it. Mr. Allan gave a charge of 6½ cwt. of coal, which would give a weight per retort of 32½ cwt. This would give 23,800 cubic feet, as against 18,750 in the paper. Or, inversely, if they took it at 18,750 cubic feet per retort, the charge would only be 6 cwt. Dealing with the method of working the two processes together, Mr. Allan said he adhered as much as possible to the same proportion of carburetted water gas to coal gas; and yet he said that no slow firing of coal-gas retorts was necessary. He was afraid he could not see this, because, as the increase of gas was required, he must put on extra retorts, if he were to preserve the proportion of coal gas to carburetted water gas. Mr. Allan said there was another advantage, in that the illuminating power was easier to maintain; but if the quantity of coal gas had to be varied, he must at the same time vary the quantity of carburetted water gas. Then Mr. Allan said that the yield of the combined or mixed gases was 16,730 cubic feet per ton of coal carbonized. Should he not add, "and of oil"? He thought this would be only fair.

Mr. T. BOWER (West Hartlepool) congratulated Mr. Allan upon placing these figures before the Association—first of all, because it was his initiation, so far as the North of England Association was concerned; and, secondly, because he had placed before them a mass of information which, he was perfectly sure, would be well digested by every member. He would like to ask Mr. Allan, who had told them that his experience obtained in the direction of high heating had been principally with Yorkshire coal, whether he had had any similar experience with regard to Durham coal, and more especially that portion of Durham beside West Hartlepool—the south-east of Durham—because he had, in years gone by, done something in this direction himself, with most disastrous results to the working finances of his Company. Whether it had been that he was not on the proper track or not, he did not know; but he could tell them that they had in one case as many as 800 stoppages by naphthalene reported in one day, and that for three or four weeks the town was in semi-darkness in consequence of naphthalene. They would agree with him that when he abandoned any further experiments, he was only doing the best he could for everyone concerned. He really envied Mr. Allan for the results of his high heats.

Mr. T. HARDIE (Gateshead) said he was not quite sure that Mr. Allan had made out his case for these high makes per ton. When he looked through the paper, he was surprised to see that there was such a small difference in the price per 1000 cubic feet, as between carburetted water gas and coal gas. The author had explained this somewhat in his remark that all his work was done by hand labour. He thought that if Mr. Allan were working with machines, the price would be reduced by at least 1d.

per 1000 cubic feet. This would make a difference. Instead of his cost for increasing the illuminating power from 14½ to 15½ candles, which he at present produced under ordinary circumstances, being, according to the paper, a little over ½d., it would be increased to 1½d. per 1000 cubic feet. He considered this could be done very much cheaper by cannel than by the introduction of carburetted water gas. With cannel he thought that Mr. Allan would be able to increase his illuminating power, and still have as large a make of gas, for almost a third of 1½d. Like Mr. Drury, he was very much interested in what that careful supervision was which prevented stopped pipes and pitched mains. He had had no experience with Yorkshire coal; but with Durham coal he did not think it could be done. Even with screened Durham coal, they could not get 12,000 cubic feet per ton without having very serious trouble with the hydraulic mains. With screened South Yorkshire coal, which was of a rather different class, it evidently could be done; but they would really like to know how. With regard to Mr. Allan's remark about the cost of the coke he charged to his carburetted water gas, he would probably place this to his advantage, and say that he had taken the price of the water gas at its very highest. But he thought it was only fair that the cost of the coke should be charged at its selling price at the particular time. This was the usual way; and he thought that it was the only way really of getting at the correct cost. The advantages of using water gas were that so much coal was not required, and this might increase the price of coke and tar. But there was no doubt that if they all introduced carburetted water gas, and made it for 25 per cent. of their output, the price of oil would increase considerably, and he doubted very much if they would be able to produce carburetted water gas at the figure which was given in the paper.

Mr. W. Ford (Stockton) had no remarks to make beyond those which had been made by Mr. Drury. He could only think it was the usual Scotch caution not to give a reason for anything they were dealing with, which was really the reason why the details asked for had not been put in the paper; but he hoped that Mr. Allan would now favour them with the details.

Mr. G. S. Sayner (Harrogate) said that one or two speakers had asked questions which he had noted. One of these was with reference to high-temperature working; and he would like to know how Mr. Allan obtained it. In their experience at Harrogate, when they had tried it they had always had trouble, which was not compensated for by the high make. He would also like to know whether Mr. Allan had adopted a retort-house governor to effect his purpose. With regard to the net cost of gas into the holder, would Mr. Allan tell them what this would be, without any connection with water-gas plant at all? With regard to the use of cannel, they might take it that Mr. Allan found water-gas plant in the works on his arrival there. Might he also ask Mr. Allan, as to the coke sold per ton of coal, whether he could sell all the coke, if none of it were consumed in water-gas plant.

Mr. Allan, in replying on the discussion, said the make of coal gas, as they saw from the paper, had increased practically from 11,000 cubic feet in 1901 to 12,500 cubic feet now. They had worked very carefully in the retort-house to obtain these results; and the careful working chiefly consisted in the regulation of the heats, because the whole thing was dependent on the uniform temperature at which they were working. This was regulated gradually and carefully until the heat reached a point of such a uniform nature that no difficulty arose either with pitched mains or stopped ascension-pipes. In working these Klönne settings, it was possible to have the heat in the combustion chamber irregular—say, intense over the furnace, then a dark patch might follow farther on, and at the far side of the combustion chamber the heat again might be very high. In other words, instead of having local heating in any part of the combustion chamber, the temperature must be regulated by the blocks covering the nostril-holes, so that the heat was kept as uniform as possible throughout its entire length; otherwise with the uneven heating, even at lower temperatures, trouble would be found both with thick tar in the foul mains on the top of the bench and with the ascension-pipes. But when the heat was kept uniform, even at a much higher temperature, this trouble did not arise. They were working chiefly with dry mains; but periodically, during the renewal of the retorts, they had had to use the old settings with hydraulic mains and dip-pipes. A few years ago, in changing over, he found there was a marked difference in the make of gas per ton. But when he explained that the retorts to which they changed over were antiquated (they were put in in the year 1873), it would be sufficient to account for that, as the seal could not be regulated in any way and no provision made for dealing with the tar. Therefore, working under these conditions, they did not get, nor expected, the same make as from the dry mains. Within the last two years, he had renewed one-half of the house, and put in Klönne settings with hydraulic mains, with all recent improvements, including Dillamore tar-towers. They could regulate the dips to a nicety; and he found the results they were getting from the hydraulic mains with the regulated dips, although not quite, were very nearly as good as they were getting from the dry mains. He was sure that when the men were accustomed to work with hydraulics, the returns would come out equally as well. As to the life of the retorts, it was their practice to renew them after working three seasons—between 900 and 1000 working days. But since putting in the new bench he had now got something to fall back on, and they were going on for the fourth season; and possibly a fifth season's working might be obtained from them. As to the fuel account, from repeated tests made he found it ran to about 12 lbs. of coke per 100 lbs. of coal carbonized. With regard to naphthalene, it was a difficult matter to deal with at one time; but after several different methods had been tried, the one they were now working, and which had been in use during the past three or four years, gave very good results. It consists in washing the gas in a Walker washer in the carburetted water-gas tar; a little fresh tar being run in each day. The one thing they had to observe in working the washer was not to allow the temperature to get below 70°; otherwise the illuminating power would be depreciated. The amount of naphthalene going into the town since they adopted this system of washing was from 3 to 4 grains per 100 cubic feet. As to Mr. Drury's remark regarding the make of 18,750 cubic feet per retort, against the 23,800 cubic feet, if they worked it out on 12,497 cubic feet to the ton, they would find the latter figure was correct. But in giving the former figure, he was simply taking the beds as producing 150,000 cubic feet each per day. He had had no experience of working with Durham coal in his present works; and from his past experience of it, he preferred South Yorkshire coal. He quite agreed with Mr. Hardie's remark about adopting machinery, and thereby cheapening the net cost of coal gas into the holder; and no doubt this would come in time. They had just been making certain alterations and extensions in the retort-house; and these had been carried out with a view of ultimately adopting machinery. With regard to increasing the illuminating power with cannel instead of carburetted water gas—well, the water gas was there, and he considered it his duty to make the best of the plant he had; and that was what he had tried to do in this case. As to the cost of water gas and the statement made by one of the speakers that if all gas companies and corporations were to adopt it the price of oil would go up, his idea was that the demand for oil would create the supply. From what he saw in oil journals, they were always finding out new fields; and he thought if there was the demand the supply would be forthcoming. With reference to Mr. Sayner's remarks as to retort-house governors, they had one; but it was only used when they were working dry mains and hydraulic mains together. Of course, the retort-house governor had to come into use then, because the dry main had to be worked at about a level gauge, and the hydraulics at 5-10ths to 7-10ths vacuum. As to the quantity of coke sold per ton of coal carbonized, including the amount used in the carburetted water gas, it ran to fully 10½ cwt.

RETORT-HOUSE WORKING FOR SMALL WORKS.

By Mr. F. Paternoster, of Felixstowe.

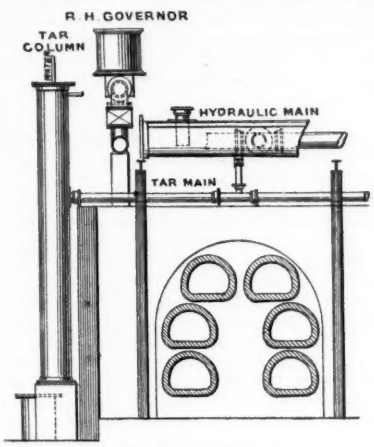
[A Paper read before the Eastern Counties Gas Managers' Association, May 1.]

In these days of dear coal, labour troubles, and competition, it is one of our chief aims to keep the cost of production at a low figure, to obtain the maximum quantity of gas from the coal we carbonize, and to sell at the lowest possible price a gas which will give satisfaction to the consumer, increase the business of the company we serve, and at the same time earn for the shareholders a fair interest upon their investment. The old adage that dividends are made in the retort-house is as true to-day as when first uttered, though the manager must also recognize that he is a seller as well as a maker of gas. We find by a study of the records of the Institution of Gas Engineers and the District Associations, that, during recent years, much has been done to increase the productive power of the retort-house. It is the day of high heats and large makes per ton of coal, which are obtained without reduction in the value of the gas supplied to the consumer. This latter statement may be disputed by some; but there is no doubt in my own mind that, owing to the gas of to-day being principally consumed by the bunsen burner, it is every bit, and even more, valuable to the consumer than would be the rich, smoky gas of past days, when flat-flame lighting was chiefly in vogue.

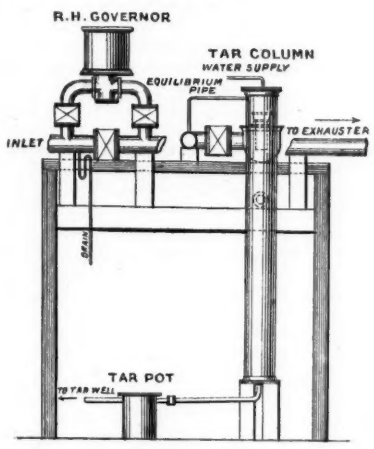
The manager of a large works with regenerative settings, horizontal, inclined, or vertical retorts drawn and charged with up-to-date machinery, is in a position to obtain the best possible results; and, principally during the past twelve months, we read of, and see, installations of retort-house governors and improved methods of removing tar from the hydraulic mains, which help in producing makes per ton hitherto thought impossible. But what of the small fry who are in charge of works where at present it is not, and may never be, possible to instal expensive manufacturing plants, where direct-fired retorts are still in use, and must continue to be used indefinitely? This, then, is the object of my paper—to show how, even in the smaller works, without any large expenditure, something can be done to reduce manufacturing costs, and to obtain part, if not all, of this extra gas per ton of coal, which may in some cases, with the existing high price of this material, obviate the necessity of an increase in the selling price of the gas. I have no intention of making my principal point the actual quantity of gas obtained per ton of coal, as it depends in a great measure upon the quality of the material carbonized, and the plant at disposal for carbonizing purposes; and the specified quality of the gas and the burner used for testing will also slightly affect this figure.

The Felixstowe Gas Company is still one of the smaller concerns in the district covered by the Eastern Counties Association;

and though the consumption of gas is increasing rapidly (nearly 300 per cent. in ten years), it has not yet been deemed advisable to materially alter the manufacturing plant. When I took charge in 1901, the make of gas was just over 12 million cubic feet; in 1904 (when I last read a paper at a meeting of the Association), it had increased to 25 millions; while for the year just ended it exceeded 33 millions. This year I think the figure of 40 millions will not be far out. The retort-house contains a bench of five settings, six retorts to a bed, 10 ft. long and 22 in. by 16 in. D, heated by means of direct firing; and as recently as 1906 we were working—as I daresay a great many small works are still working—with the hydraulic mains supported from the top of the



Front Elevation.



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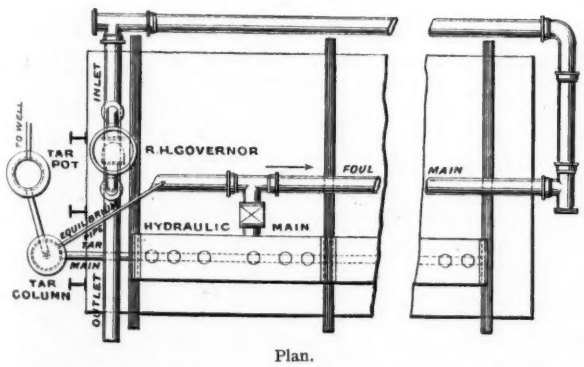


Plan.

The Hydraulic Main Arrangement at the Felixstowe Gas-Works.

[Mr. Paternoster explained that these were not detailed drawings, but had been merely roughly drawn by him for the purpose of elucidating any point that might arise in the discussion.]

bench, the dip-pipes heavily sealed, and the tar and liquor overflowing at the weir-valves, keeping company with the gas to the condensers.

Though I believe the results obtained were very fair, taking into consideration the material at disposal, still I was anxious to improve matters; and I think a short description of the alterations will prove of interest to my brother managers. I make no claim to originality in the methods adopted, which are simply the outcome of a study of the Technical Press, attendances at Association meetings, and friendly intercourse with the members. Late in 1906, the retort-house governor was brought prominently to my notice; and one was installed at Felixstowe in November of that year. Immediately following its adoption, I found it was possible to lower the seals in the hydraulic mains, to work with a steady vacuum, and to maintain an almost constant illuminating power. But there was practically no increase in the make of gas per ton of coal. Consequently, I cannot agree with some who have publicly stated "that the make can be safely increased by 1000 cubic feet per ton, with the greatest ease, no attention, and no trouble, by the adoption of a retort-house governor." I have arrived at the conclusion, from after-experience, that the retort-house governor is the starting point; and to work in comfort (in the manner I am about to describe) without it would be practically impossible. But by the adoption of this piece of apparatus alone, under similar conditions as were existing at Felixstowe in 1906, unless previous results were very bad indeed, I think the man will be disappointed who expects an immediate increase of 1000 cubic feet of gas from a ton of coal. The governor is, however, well worth the money spent upon it, if only for the comfort and safety which it ensures.

Early in 1907, I erected a tar-column at one end of the retort-bench, the working of which, though well known to most of you, will, I think, bear explanation at this point. Each hydraulic main—in this case, there is a separate one to every bed of retorts—is connected with the column by means of a pipe running along the top of the bench. There is a valve under each main, which is always open to this pipe when the bed with which it is connected is at work. The top of the column is connected by a small pipe to the foul main on the hydraulic side of the governor. This is known as an equilibrium pipe, and ensures the vacuum being the same in the column as in the main. At the base of the column there is a valve, by means of which the tar is run off into a pot, overflowing from there to the storage tank. The column and hydraulic mains contain water or liquor, the level of which must necessarily be the seal of the dip-pipes. The tar produced in the hydraulic mains gravitates to the bottom, through the open valve, along the pipe and into the column, where it deposits. Water or liquor replaces it in the mains; and the surplus liquor overflows at the weir-valves and runs down the foul-main to the inlet of the governor, where, by means of a sealed pipe, it drains into the aforementioned pot. On some works, I believe the column has an overflow at the seal-level to obviate this; but I find my arrangement works quite satisfactorily.

It is my custom to work six-hour charges, with spells every two hours. Thus very few charges are burnt off at the same time; and I believe the quality of the gas is maintained at a more constant figure than when there are longer intervals and a larger proportion of the retorts drawn and charged together. After the round is finished, it is the duty of the head stoker to open the valve in the base of the column and run off all the tar which has accumulated. This slightly lowers the seal in the hydraulic mains, which automatically make-up in the ensuing two hours; and it ensures there being at any time very little but water or liquor in the mains. The contents of the hydraulic mains and column are also taken off once a week and replaced with clear water. The result of the adoption of this method of working, in conjunction with the retort-house governor, was very gratifying; for there was an immediate increase of well over 500 cubic feet of gas from a ton of coal.

I now found that another matter required attention, for a light water-seal soon pointed out the fact that the hydraulic mains were not level; and naturally some dip-pipes had more seal than others. The ironwork of the retort-bench required renewing; and it was decided to provide new buckstaves and joists to support the hydraulic mains independently of the brickwork. This gave me an opportunity of levelling the mains; and following some conversation with Mr. J. T. Jolliffe and Mr. F. Prentice, of Ipswich, I arranged for an alteration to the dip-pipes. The work was done in sections; and while erecting the buckstaves and joists, the dip-pipes were taken out and treated in the following manner: The socket-and-spigot ends were turned in a lathe to an exact measurement, and the interior of the spigot end was turned out smooth, tapering toward the spigot. The socket end was faced; so that, by means of a straight-edge and spirit-level, it can always be easily determined whether every dip-pipe has the same seal. With regard to the tapering-out and facing of the spigot end, I think sometimes that too little attention is paid to the hydraulic main part of our plant, and any rough casting is considered to be good enough for a dip-pipe. The seal will probably not be equal all round it; and it will be a difficult matter to find two pipes of exactly the same length. A dip-pipe can probably not be made an article of beauty; but by treating it as an important, instead of a minor, detail of the manufacturing plant, the trouble and the expenditure will be well repaid. Two beds of retorts being refitted in this manner, they were put to work. The results quite surprised me, and exceeded my expectations; for the make of gas per ton of coal was increased by another 400 cubic feet, and, with the previous increase, practically realized the figure for which I had been striving—the extra 1000 cubic feet coming from the coal without apparent effort or effect upon the gas.

Referring to the method of drawing the tar from the hydraulic mains, I was reading, a short time back, a presidential address in which the writer stated that, in his own case, the mains were filled with liquor previous to drawing the retorts—giving 1-inch seal. After the retorts were charged, the liquor was run off and the main worked dry; and he experienced trouble with this liquor in his wells, which affected the sulphate of ammonia returns, and he

had to adopt means to overcome the difficulty. I have no trouble in this direction, nor, I believe, does anyone working in the manner I have described; and practically the same results seem to be obtained by either method. The above-mentioned gentleman sometimes reaches 12,000 cubic feet per ton. So have I; and though for certain reasons I have not been able to maintain this make, yet I have hopes of bringing my average nearer it than it is at the present time.

The total cost of the Felixstowe installation, including governor, tar-column, removing the old and erecting new ironwork to five settings, only just exceeded £100. This expenditure will be well repaid; for though not in full operation till the end of June, 1907, the cost of coal for the whole year was less by over £200 than would have been the case if the results obtained per ton of coal had been the same as in the previous year.

Coming to the actual make of gas per ton of coal, as I stated previously, to be comparable with other works, certain local conditions must be taken into consideration. In the first place, the quality of the coal carbonized. For some time past we have been using chiefly two classes of coal; one a large screened coal raised near Sheffield, the other a washed nut, consisting of a blend from two collieries—a Silkstone raised near Wakefield, and the other from the Parkgate seam, near Mexborough. We have also had, owing to the coke which it produces being more suitable than that from the others for the furnaces, a small quantity of washed nut raised near Barnsley. Secondly, the retorts are direct-fired, and were, until a few months ago, shovel charged; a simple scoop machine being now in use. The make per ton of coal for the year 1907 was 11,043 cubic feet, and for the nine months since the installation has been in full work—from July 1, 1907, to March 31, 1908—11,487 cubic feet of about 15½ to 16 candle power gas, tested by the No. 2 "Metropolitan" burner (the standard being 14-candle power). I have here a few sheets from a registering gauge, which show the regularity of the vacuum in the foul main. I regret that there was no registering gauge at work previous to the fixing of the retort-house governor, so that a comparison could be made; but no doubt all know the irregular diagram that would have been obtained. The valves on the hydraulic mains are set to give ¾-inch seal, and I find 2-10ths to 3-10ths of an inch vacuum is sufficient to take all the gas away from the retorts; the vacuum at the inlet of the exhauster being about 6 inches.

Discussion.

The PRESIDENT said the paper that had been read by Mr. Paternoster was brief; but he thought the members would agree with him that it was extremely practical. The author was speaking and writing as a young engineer—young but indefatigable—in charge of a small works. He thought they would concur with him that the thanks of the members were due to Mr. Paternoster for the care he had taken in the preparation of the paper.

Mr. J. T. JOLLIFFE (Ipswich) said he was sure he might ask his fellow-members to congratulate Mr. Paternoster on the excellent work he was doing. To his mind, the paper showed that many of them in the past had been too careless of the little niceties that were desirable and necessary in connection with the retort-house hydraulic mains, if they were to do the very best work possible. That in a relatively small works like Felixstowe, it was possible to obtain over the whole twelve months above 11,000 cubic feet of gas per ton, and at times bordering on 12,000 cubic feet, conclusively showed that the man with the shovel was not dead yet; and, further, that there were possibilities for all of them to look forward to. The little things that Mr. Paternoster had done seemed to be principally in levelling the hydraulic mains and tapering the dip-pipes to a knife-edge. Now, if it was possible to get such satisfactory results from such little points, were there not possibilities that they might still go on improving, and reach a still higher figure? As the members all knew, the subject of retort-house work was now being considered by a Committee appointed by the Council of the Institution of Gas Engineers; and he was sure all were looking forward to the results of the Committee's labours. He told Mr. Prentice not long ago that he was looking to him to get 12,000 cubic feet of gas per ton of coal in the near future at Ipswich; and he hoped Mr. Paternoster would also go on, and try to aim for something better. A make of (say) 11,000 cubic feet per ton by itself was just a little misleading, unless they knew also what was the illuminating power which was constantly and regularly supplied. Mr. Paternoster gave 14 candles as his standard, and that was 14 candles tested by the "Metropolitan No. 2" burner. He had told them that he sent out 15½ to 16 candle gas, also tested by the No. 2 burner. Might they take it that 15½ to 16 candles was fairly representative of the illuminating value of the gas?

Mr. PATERNOSTER: It is practically constant at that.

Mr. JOLLIFFE said his reason for asking for this information was that the members might be able to judge of the real ultimate character of the work Mr. Paternoster was doing. If they made 11,500 cubic feet of gas per ton, and multiplied it by 15½ candles, they got 175,000 to 180,000 foot-candles per ton of coal carbonized; and it seemed to him that, if they were to judge and compare their work with that of their fellows, it was necessary they should have the full details, so that they might be able to emulate the work that was really best in result. He did not know whether Mr. Paternoster had made any further changes than those mentioned in the paper—whether he had done anything towards filling his retorts fuller each time of charging than had been the custom in the past.

Mr. PATERNOSTER: No.

Mr. JOLLIFFE (proceeding) said that in Ipswich they had found some valuable results from charging their retorts nearly full—as nearly full as was practicable. This method of working was more possible where the discharger was used for pushing the coke out of the retort. The result had been that it had practically cured stopped pipes; and it had certainly very materially improved the quality of the coke and tar. To be able to say this was a matter of no small consequence, because the tar distiller, with the impudence that characterized tar distillers [laughter], credited the Ipswich tar with being the worst in creation. But, joking apart, he was glad indeed to have had these successful and valuable improvements brought forward in the paper; and he offered his thanks to Mr. Paternoster, and his congratulations to the Company he so ably served.

Mr. R. G. SHADBOLT (Grantham) remarked that Mr. Paternoster had placed the members under a double obligation that day. When they came to think that, in addition to the trouble he had taken in connection with the arrangements for the meeting, he had prepared a paper on this question of retort-house working for small works, to provide them with technical fare for the meeting, they would agree that it showed great enthusiasm. There were one or two points in the paper which appealed to him. He thought the way in which Mr. Paternoster had, as it were, dissected the results that had been obtained, and which had been hitherto credited to the use of the retort-house governor, was most valuable, as well as very practical. Of course, there was no cure-all in the retort-house any more than there was in any other sphere of life or work. Meriting their admiration was the way that Mr. Paternoster had worked at these questions, and arrived at the practical conclusions first to get a retort-house governor, then to adjust the seals, and to arrange for a continuous removal of the tar. These were all factors that went much to the question of improved results, and were all factors which could not well be ignored. Just on the face of it, although Mr. Paternoster did ultimately come to the explanation, certainly it took one back a moment to read a statement at the end of the second paragraph:

> **It is the day of high heats and large makes per ton of coal, which are obtained without reduction in the value of the gas supplied to the consumer. This latter statement may be disputed by some; but there is no doubt in my own mind that, owing to the gas of to-day being principally consumed by means of the bunsen burner, it is every bit, and even more, valuable to the consumer than would be the rich, smoky gas of past days, when flat-flame lighting was chiefly in vogue.**

Of course, the whole matter was now an altogether different one compared with what it was even ten years ago. The question now was not how many foot-candles could be got out of a ton of coal, but how they could best serve the purposes of their consumers. There was not the slightest doubt it was quite possible, and in many instances it was done, to send out a gas which, under everyday normal conditions, did not secure sufficient air for complete combustion, and which brought them into discredit, through smoky chimneys, blackened fuel in fires, inefficient results in the incandescent burners, and so on. The one great object they had to aim at at present was to provide a gaseous fuel which should require no more air for its complete combustion than was usually obtainable under conditions which held good in connection with the ordinary consumer, quite apart from laboratory conditions. One could not help congratulating Mr. Paternoster upon the great increase, proportionately speaking, of the output of gas of the Felixstowe Gas Company. He (Mr. Shadbolt) almost envied him, because, if there was one thing which tended to keep them abreast of the times, it was a fairly high rate of increase in the output of gas, which compelled them to keep their eyes open as to what was the best, and, if they had anything inefficient, to get rid of it at the earliest possible moment. Of course, if one was committed to a considerable expenditure on inefficient plant, and at the same time was suffering from a stationary output, the only course was to make the best of a bad bargain; but both the undertaking and the consumers continued to suffer. A state of growth was the most natural and beneficial position for both a gas undertaking and its customers. There was one remark as to the admission by Mr. Paternoster that he made no claim to originality in the paper, but that his work was the outcome of a study of the Technical Press and his attendance at Association meetings. This was an acknowledgment that everybody had not the courage to make; and it was one that should go forth from an Association such as this, as indicating that they did more good than was represented by the printed reports of their proceedings when they met together. With respect to the action of the retort-house governor, of course its principle was to maintain the pull when the heaviest part of the gas was being evolved from the charge. If they took diagrams (as many of them did), they would find, if watched closely, that, under normal conditions—that was to say, with six-hour charges, with three-hour intervals, and with a certain fixed pull in the exhauster—when the greatest rush of gas was coming off, the pull in the hydraulic and in the retorts became reduced, or might even turn to pressure. This was why they had been losing in the past. He pointed this out with a view of giving one little hint as to how to obtain these improved results so far as the action of the governor was concerned, where it was not possible to put in a retort-house governor. One way was to ensure that a good pull reached the

point (should he say?) of generation, whatever the quantity of gas coming off might be. Yet another way was to arrange for a graduated pull, so that there was the maximum pull when the greatest volume of gas was coming off, and the minimum pull when the smallest quantity of gas was coming off. This could be done by a simple water-loading arrangement in the exhauster-room; and they would find that, by this means, rather better results would be obtained than by the use of retort-house governors, provided they had a sufficient lapse of time between the charges. In Mr. Paternoster's case, he had only a lapse of two hours; and possibly in that case the retort-house governor, with a good pull throughout the whole of the working hours, would be the best way. But where many were working with six-hour charges, going on every three hours, they certainly had a rush of gas immediately after charging, which increased to the maximum up to 1¼ to 1¾ hours from the commencement of the charge. If they would study the rise and fall in the flow of the gas, and adjust it accordingly, so that the pull increased with an increase in volume and decreased with a decrease in volume, an equally good result would be obtainable as with a retort-house governor. He should characterize the paper as being one of the most practical and useful the members had had before them.

Mr. E. W. Smith (Chelmsford) said he should like to add his appreciation of the paper. Carbonization was an oft-recurring subject with gas engineers; but it never lost in interest and fascination for many of them, and it would be a long time before the last word was said about it. The members had been asked to discuss the paper; and if the view he took did not quite coincide with that of his friend Mr. Paternoster, he could not help it. In considering a matter of this kind, one endeavoured to arrive at a conclusion as to how results, such as those given in the paper, had been obtained. Mr. Paternoster, he gathered, thought they were due greatly, if not wholly, to the tar-towers, to the levelling of the hydraulic main, to the lowering of the liquor seal, and perhaps to the retort-house governor. His (Mr. Smith's) opinion was that the retort-house governor had really had more to do with the increased yield of gas than anything else; and his reasons for thinking so were these: For some years now, he had been working with regenerative settings at high heats, and with anti-dips. He had no liquor seal whatever. A retort-house governor had not yet been used. They had, however, one on the works, which would be shortly fixed; and he hoped then he would find the yield of gas per ton would be much increased. The reason he thought the retort-house governor had had more to do with the improved results than anything else was because a steady pull of gas was obtained—a steady flow direct from the retort, through the whole apparatus, right up to the outlet side of the exhauster. Those of them who had done much in the experimental testing of coal in small iron retorts would have noticed at times that most extraordinary results were obtained at no very high temperature—at no *apparently* high temperature, because he was not sure that the temperature even of clay retorts was not somewhat deceiving. But when testing coal in iron retorts, they exhausted it by means of a counterbalanced holder, which gave a very steady pull—drew the gas away very steadily—during the whole period of the distillation or test; and the retort-house governor similarly gave them the steadiest pull, the nearest to the counterbalanced holder, that he had been able to obtain up to the present. Watching the gauge in any retort-house, a considerable variation—a considerable oscillation—was seen on the gauge, which indicated not perhaps quite the amount of oscillation in the mains, but, if it were followed right back to the retorts, it could readily be imagined that momentarily there was a slight pressure, and then a pull on the gas in the retorts. This slight pressure might very materially indeed alter the character of the volatile hydrocarbons coming off. The lighter hydrocarbons might be forced into the porous material of the retorts, and through the cracks and fissures; and, when drawn back again into the retorts, they might be altered in character. Carbon might be deposited, and the gas reduced in volume. He was trying now to account in some way for the increased volume of gas, by a steady pull, which Mr. Paternoster undoubtedly obtained when he introduced the retort-house governor. He (Mr. Smith) should think such a result had been brought about without lowering the illuminating power of the gas, or perhaps affecting the calorific value, which was very important to the gas consumer of to-day. Mr. Jolliffe, in referring to heavy charges—filling the retort full up with coal—led him (Mr. Smith) to think that perhaps heavy charges might approach nearly the result in the quality of the gas obtained in iron retorts when testing coal. The volatile hydrocarbons, in passing through the incandescent material in the highly-heated retort, would be broken up, and altered both in character and volume; whereas, in Mr. Jolliffe's case, the charge was increased, he took it, without increasing the temperature of the retorts.

Mr. Jolliffe: Yes, sir.

Mr. Smith: And the gases were liberated and drawn away before they had time to become split up and the volume reduced. He should like to ask Mr. Paternoster if he would tell them whether he had noticed much difference in the amount of carbon deposited in the retorts, what number of stopped pipes he had found, and whether he had tested the calorific value of the gas, and found any change.

Mr. Thomas Glover (Norwich) said, after the very able remarks that had been made by Mr. Shadbolt and others, he felt rather afraid to touch on this subject. It was such a big one, and apparently an unending one, for discussion at the present time. A process of ideal carbonization would only be reached by a process of evolution; and Mr. Paternoster had sketched for them in the paper the course of evolution that his carbonizing appliances had undergone. One could not help feeling how very crude and imperfect had been the plant in the retort-house until quite recent years. How simple it all seemed now when they came to think over it, that the seals should be even, dip-pipes should be cut off to an exact length, the mains should be level, and the tar should be drawn off regularly, and not be allowed to volatilize in the hydraulic; that the seal should be of liquor and not of tar; and that the draw of the exhauster should be regulated, so that, when a large volume of gas was being given off, it should be readily removed, and not throw back-pressure on the retorts. All these things, when they looked back, seemed exceedingly simple; yet how many years had it taken to arrive at the result? It was to be hoped that with such papers as this one by Mr. Paternoster, other members, who had been less bold, would have the courage to tackle their hydraulics and dip-pipes, and to put in a retort-house governor, and draw away the gas as it was made, and not let it hang about in the retorts, and get converted into free carbon, hydrogen, and so forth. The gist of the matter was that they wanted as little pressure inside the retorts as possible. They wanted the gas to hang about in the retorts as short a time as possible. They wanted it evolved quickly, and taken out of the retorts as rapidly as possible. And the steps that Mr. Paternoster had noted for them were no doubt in the right order. He did not agree with something the author said about the retort-house governor not giving an increased yield of gas, or helping to give an increased yield. He believed the author said it helped to increase the yield indirectly; but he (Mr. Glover) thought it helped them directly, for it assisted in getting a lighter seal. The retort-house governor did this more perfectly than any other apparatus they could think of, because it was perfectly automatic; and if it was perfectly automatic, it ensured the maximum amount of pull which could safely be allowed, and, as the volume of gas declined, the pull was adjusted, and there was no over-pulling. As several gas managers had said, they could now sleep at night after installing retort-house governors. Where illuminating power was a serious matter, there was no fear of drawing in air; and at the same time there was the pleasure of knowing they were getting all the gas from the retorts whatever was the volume that was being given off. He noticed that Mr. Paternoster went to an extreme length with regard to securing a water-seal. He said: "The contents of the hydraulic mains and column are also taken off once a week and replaced with clean water." He (Mr. Glover) should say this was unnecessary, because liquor was quite as good as clean water in the hydraulic mains. The clean water was converted into ammoniacal liquor in about ten minutes. The coal was constantly making water; and if they were drawing the tar from the bottom, they had liquor seals. It did not matter about running in clean water. The liquor seal was the thing; and no doubt the coal would give it so long as they drew away the tar. He thought it an exceedingly useful paper, and that it would have good effect in encouraging other managers to go and do likewise.

Mr. W. D. Child (Romford) said he had only just fixed a retort-house governor; and he hoped it would be really beneficial to him in the work he had to do, for the reason that he had not been dependent upon the great nicety of seal that Mr. Paternoster had pointed out, in having the ends of his dip-pipes turned off at a fixed length—having worked for many years with anti-dips. At the time the retorts were making gas, the dips were free from any seal whatever. But then one had to be very careful indeed in the running of the exhauster, to prevent the spoiling of the illuminating value of the gas. He hoped by the retort-house governor to adjust the pull, and to obtain the best quality and quantity of gas, and to be relieved from a great deal of anxiety as to the overdrawing and spoiling of the illuminating power of the gas. There was only one point he would mention which occurred to him through the remarks of Mr. Shadbolt. That was as to the time of charging. He gathered from Mr. Shadbolt that he was using six-hour charges, divided up into three hours' working, so that naturally there would for some short period be a large volume of gas being produced, and at other times a much smaller quantity. But he (Mr. Child) should have thought that, in any works, it would have been desirable to produce gas in as even a quantity during the day as possible, even if, in large works, they divided the charging up into two-hour work. In this way, not only would the quantity of gas be more easily maintained, but every portion of the plant throughout the works would be rendered capable of doing the utmost it possibly could do in producing the largest quantity of gas per day.

Mr. F. Prentice (Ipswich) remarked that he should like to have the opportunity of congratulating Mr. Paternoster on his paper, and the more so on account of the fact that he was a child of his. The author came from the Ipswich Gas-Works; and he had had many difficulties to get over. No one could rejoice more than he (Mr. Prentice) did in the success that Mr. Paternoster had attained; and the paper he had just read indicated this success in a very marked manner. With reference to the question raised by Mr. Shadbolt, he might be allowed to say that in charging retorts at Ipswich they had found that the shorter the interval the better. They worked eight-hour 9 cwt. charges in 21½ in. by 16 in. retorts; and they had been accustomed to work during the winter in spells of 2 hrs. 40 min.—that being a divisible number. But as the winter passed, and the settings

began to get reduced, they found a very marked difference in the quality during the interval, as great a difference as between 11½ and 17 candles. In consequence of this, Mr. Jolliffe suggested they should halve the period; and since then they had worked spells of 1 hr. 20 min., with a marked improvement so far as the regularity of the illuminating power was concerned. Personally, if he could do it, he would halve that, because he believed they would get still better results. The only difficulty he foresaw in very large charges and long intervals was this question of the fluctuation of the illuminating power. When they had ample holder room, or water gas to compensate, perhaps it did not matter very much. But there were times in the winter when they got low and had to work in and out; and then it was a very serious thing indeed if at any time the gas fell to as low a figure as he had mentioned, especially when they were being tested against by an official up-town. Mr. Glover had had a word to say about drawing off the water from the hydraulic mains. Perhaps he might say they never drew off the water in the mains at all. They made sure that no tar was there; and so long as there was no tar, they were satisfied that the liquor would do its work without absolutely emptying the mains. After some twelve months or more working, he was satisfied there was not ¼ inch of tar in any one of the mains at Ipswich. This was an important thing; and it should be watched every day. If it was attended to, the actual running off of the water or liquor in the main was of small moment.

The PRESIDENT said, before he called on Mr. Paternoster to reply, there were one or two matters upon which he should like to speak; and more particularly with reference to the retort-house governor. It might be remembered that, in September last, he (the President) was proposing to put one in at Gravesend. This had since been done; but he must confess that, for some time, he was thoroughly disappointed. He found that, instead of making more gas per ton, he was making considerably less. But, of course, he was working under disadvantageous circumstances. He was, under the old system, pulling on the exhauster, and making allowance on the dips. When he put the governor in, he set it to work at a level gauge, and naturally did nothing with the dips except to work them down as low as he could. He found that his make went down considerably. He had been troubled with a slipping of the seal—that was to say, the water in the hydraulic mains got licked up in some mysterious way, and air was being pulled in—and very badly indeed at times. This had, of course, been cured. He found the best cure on the whole was by—not levelling his dip-pipes, not taking them out and turning them or putting a knife-edge on them—doing away with them altogether. He was now working without any seal whatever; and his make had gone up from 10,500 to 11,000 cubic feet. Of course, they glibly talked now about 12,000 cubic feet of gas per ton. Twenty years ago they were making 10,200 or 10,300 cubic feet per ton, and thought they were doing very well indeed. Illuminating power, however, was not taken so much into account now. In Mr. Paternoster's case, he was testing by the No. 2 "Metropolitan" burner. What was he doing with the "London" No. 1? Presently someone would make a No. 3 burner; and then they would be able to get about 14,000 cubic feet of gas per ton. It was impossible to pour more into a quart jug than it would hold. At present he (Mr. Davis) was making 11,000 cubic feet per ton of coal carbonized; and that was gas tested by the No. 1 "London" argand.

Mr. PATERNOSTER, in reply, said he must thank the gentlemen who had joined in the discussion. He had hoped it would promote a good discussion; and he was not disappointed. At the same time, there did not seem to be a great many questions to which to reply. Mr. Jolliffe had made a point about candle power. The President had just put it very clearly. It was 15½ to 16 candle-power by the No. 2 "Metropolitan" burner; by the "London" No. 1 burner, it was about 2 candles less. But they saw no smoky mantles in Felixstowe; and they had a gas that satisfied the consumers. There was an Inspector appointed by the Council who looked after the gas pretty well; but now that they had the No. 2 burner, they had not had a test for about six months. With regard to the charging of the retorts, he had not tried heavier charges with shovel work. They had no complaint at the present time of the tar. Mr. Smith did not agree with him that the retort-house governor did not increase the amount of gas per ton. The retort-house governor and the tar-tower in his case were not started at the same time. But he got nothing like the make of which he had spoken until the tar column was at work. With the conditions under which they were working, they could not expect a great increase until they had removed the tar. They had practically no stopped pipes; and with regard to carbon, they never had a great amount on their retorts—nothing in fact, of which he had had to take much notice. Mr. Glover had spoken about emptying the mains. Perhaps this was only a fad of his (Mr. Paternoster's). He could not say it was much good, except that it ensured that the mains and the valves were clean, and not likely to get choked up during the working period.

The London and Southern District Junior Gas Association will hold their annual general business meeting at the Cripplegate Institute next Friday evening; and thereafter Mr. J. W. Helps, of Croydon, will deliver to the members the address which he was unfortunately unable, owing to indisposition, to give at the February meeting, when it had been originally promised.

DETERMINING TEMPERATURE OF GAS IN MAINS.

An Improved Hygrometer.

An article bearing the title of "An Improved Hygrometer for Determining the Minimum Temperature of Gas in Distribution Mains" was communicated by Mr. C. C. Tutwiler, of Philadelphia (Pa.), to the "Journal of the American Chemical Society," and appeared in a recent issue of the "American Gaslight Journal." It is worth reproduction.

In the distribution of illuminating gas, it has been found by repeated experiments that the gas will leave the works storage holder saturated with water vapour, and also with the vapours of unfixed hydrocarbons, which latter contribute largely to the photogenic value of the gas. This condition of saturation is due to the fact that the gas reaches a temperature in the storage holder which is lower than any temperature to which it has been previously subjected up to this point; and it is therefore saturated with water and hydrocarbon vapours at the temperature of the holder. It has also been found that when the gas enters the relatively colder distribution mains, some of these vapours will be dropped—the amount remaining saturating the gas at the lower temperature. These vapours are unavoidably present. They are not vapours of the oil used in making the gas, but are high temperature products of the closed-ring series of hydrocarbons formed by the heat necessary to break up the oil into permanent gas. The manner in which these hydrocarbons are dropped out of the gas and again reabsorbed, and the effect upon the candle power of the gas, is an interesting study which need not be discussed at present, as it has only an indirect bearing upon the subject of this paper. It may not be out of place to say, however, that the aim of the gas engineer is to eliminate from the gas as many as possible of the vapours of low-tension high-boiling hydrocarbons, and to retain those whose tension will permit of their being carried to the burner under all conditions of temperature and pressure met with during distribution.

It is evident that if the gas could be delivered to the consumer at a temperature equal to, or greater than, that obtaining in the storage holder, there would be no loss of light-producing hydrocarbons in the mains, and the candle power of the gas delivered at the burner would be the same as that shown at the outlet of the storage holder. While this might seem to represent an ideal method of distribution, it is not practicable from an economic standpoint, as the temperature to which the gas is subsequently cooled in the mains during some seasons of the year is far below the outlet temperature of the storage holder; and the cost of reducing the gas to the temperature of the mains at these times would more than offset any advantage gained. It has been found that the gas in the distribution system quickly reaches the temperature of the earth surrounding the mains; and where the mains are exposed, it may even be cooled to the surrounding atmospheric temperature. The attendant loss of hydrocarbon vapours, and therefore loss in candle power, is considerable, depending upon the so-called "permanency" of the gas and the degree of cold to which it has been subjected. Gases which owe any large percentage of their photogenic value to so-called unfixed hydrocarbon vapours will suffer a greater loss in this respect than those that contain a relatively greater amount of fixed hydrocarbons.

When, therefore, it is required to deliver to the consumer a gas of uniform candle power throughout all seasons of the year, it is necessary to turn into the distribution mains gas sufficiently high in candle power to take care of subsequent losses in the mains, which losses will vary from day to day. The problem at once presents itself of how best to determine what this initial candle power should be, since any excess over and above that actually necessary means financial loss to the gas company on account of extra enrichment, or, on the other hand, may subject it to penalization if it should fall below that required by contract. Since the loss in candle power is due to the reduction in the temperature of the gas in the mains, it will appear at once that the first thing to be determined in the above problem is the minimum temperature to which the gas will be cooled after it leaves the holders, and, after having found this temperature, to raise or lower the candle power of the holder gas to such an extent that, when it is cooled down to the minimum temperature, it will still have a candle power equal to that which must be furnished to the consumer.

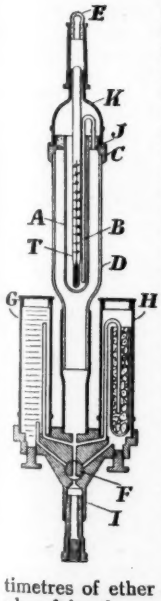
It was found impossible to determine the minimum temperature by means of thermometers placed in the mains, as the gas continually changed in temperature, owing to its passage through more or less exposed portions of the mains, or on account of its being subjected to other conditions tending to change its temperature—such as the rate of flow or nature of the ground through which the main passed. For these reasons the location of the point of minimum temperature by means of thermometers was found to be exceedingly difficult and unreliable; and the attempt was abandoned. A method was finally evolved which depended for its successful operation upon the following data: In the course of a series of experiments made in the Philadelphia Gas-Works, it was found that if a gas was cooled down in contact with its condensate to a lower temperature than any to which it had been previously subjected, and then allowed to warm up in contact with its condensate to within a few degrees of the original tempe-

rature, or to its original temperature out of contact with its condensate, the water which it would then contain, as determined by means of calcium chloride, would just saturate it at the minimum temperature to which the gas had been cooled. An explanation of this is found in the fact that if oil and water are simultaneously deposited, the oil will form a film upon the surface of the water—preventing its being again picked up when the temperature is raised, so long as any oil remains.

It appeared that advantage might be taken of this action, and the minimum temperature which the gas had reached in the mains up to any given point be ascertained by determining its water dew point. For this purpose, an ordinary wet and dry bulb psychrometer was employed; the instrument being hung in a bell jar sealed in mercury, through which a current of the gas to be tested was continually passing. The dry-bulb thermometer indicates the true temperature of the gas; while the wet-bulb thermometer registers the temperature of evaporation, which is usually several degrees below the temperature of the gas. In saturated gaseous atmospheres, the thermometers will read alike, and difference will be recorded in proportion to the dryness of the gas. The dew point may be obtained by means of these observations from Glaisher's table, by multiplying the difference between the reading of the two thermometers by the factor opposite the dry bulb reading and subtracting the product from the dry bulb reading. This instrument was given a thorough trial; and though it furnished some very valuable data, its lack of portability, and the knowledge that under the best conditions its indications were known to be only approximately near the truth, caused us to continue our efforts to devise a more satisfactory apparatus.

It was suggested at this time, by Mr. Chas. O. Bond, the Chief Photometrician of the United Gas Improvement Company, that the instrument devised by Regnault, known as the condenser hygrometer, might be adapted to our needs. The essential parts of this instrument comprise a thin wall glass vessel, quite similar in size and shape to an ordinary 15 cc. test tube, provided with a delicate thermometer, and having means for passing air through a small amount of ether contained in the tube. Upon exposing the tube to an atmosphere containing water vapour and reducing the temperature of the tube by volatilizing the ether, moisture will finally be deposited on its outer wall. When this occurs, the temperature is read on the thermometer, which reading is the temperature at which the atmosphere would be just saturated with the moisture contained therein, or, in other words, its "dew point." The apparatus as designed by Regnault was intended to be used for the determination of the dew point of the atmosphere only; but its principles were successfully utilized in an apparatus which was found to be applicable to the determination of the dew point of any gas. This was accomplished by providing means for surrounding the vaporizing tube with the gas to be tested by the use of an outside jacket through which the gas was made to flow, and providing scrubbers for the removal of hydrocarbon and water vapours, the use of which will be explained later on. In the first apparatus designed, air was forced through the ether by means of a rubber hand-pump; and it was found that at times when the dew point was very low, moisture would be deposited in the tube from the air, and so cloud the ether that the deposit of dew on the outside of the tube could be seen only with great difficulty. This trouble was finally overcome by using a current of the gas being tested to volatilize the ether; and, besides correcting the trouble, the cumbersome hand-pump was thus done away with. This and other improvements tending to compactness resulted in the improved apparatus about to be described.

The construction and operation of the apparatus is as follows:



The interior glass vessel A, known as the condensing tube, the thermometer T, and the small tube B reaching to the bottom of the condensing tube, by means of which the ether is volatilized, are quite similar to the essential parts of Regnault's apparatus; and if this portion is detached from the jacket by unscrewing the collar C, it may be used in the same way as the Regnault apparatus for obtaining the dew point of the atmosphere. In order, however, to adapt it to our purpose, the glass jacket D was provided, through which a stream of the gas to be tested could be made to flow, surrounding the condensing tube in its passage to the burner. The course of the gas from the time it enters the inlet I until it issues at the burner E on top of the instrument, is as follows: The cock F, at the base of the instrument, is so constructed that the gas, upon reaching the same, can be made to flow straightway into the jacket D, or made to first pass through one or other of the two scrubbing vessels G and H. In either course it finally passes into the jacket D and surrounds the condenser tube A. It then passes through the hole J in the screw cap covering the jacket, and into the tube B, which runs to the bottom of the condensing tube. The gas after leaving the condenser tube passes into the cap K, and is finally burned at the burner E. If a few cubic centimetres of ether or other volatile liquids, such as pentane, are placed in the condensing tube, the gas bubbling through will rapidly volatilize it, thereby reducing the temperature of the tube and causing a deposition of dew on its outer wall as soon as the point of saturation is reached. Directly this occurs, the thermometer is read, and the dew point thus ascertained. It is obvious that the instrument may be placed on any convenient gas-bracket, and that a few moments will suffice for determining the minimum temperature to which the gas has been cooled up to that point.

It has been found that the determinations made with the instrument under all ordinary conditions are very reliable. Cases arise, however, when, in order to get a correct indication of the minimum temperature, it is necessary to make use of a rubber scrubber to remove some of the hydrocarbon vapours prior to testing the gas, and more rarely to employ a calcium chloride drying tube to remove a portion of the water vapour. For example, if the gas, after having been cooled to its minimum temperature in the mains, should pass through a section of main which for some reason was warmer, and any liquid hydrocarbon was present in the main at that point, the gas would saturate itself at the higher temperature with hydrocarbon vapour; and therefore the instrument would show the dew point of the water vapour which would correctly indicate the minimum temperature. If, however, the gas is first passed through the scrubber G, which contains finely-divided rubber, the hydrocarbon vapours will be removed to such an extent that the amount remaining will not saturate the gas before the dew point corresponding to the water vapour is reached. Such conditions are rarely met with in the distribution mains. It is well, however, as a precautionary measure, to take both hydrocarbons and water vapour dew points; and if the hydrocarbon vapour dew point is found to be higher than the water vapour dew point, the latter should be taken as representing the minimum temperature. Again, it is possible that the gas, having reached its minimum temperature, may warm up in contact with water vapour which has been introduced into the gas, as, for example, in purifiers where steam is admitted for manufacturing reasons. Under such conditions the calcium chloride scrubber H must be used, and the dew point of the hydrocarbon vapours taken as the minimum temperature.

It is a very simple matter to test the gas in all three ways—*i.e.*, direct, through the rubber scrubber, and through the calcium chloride scrubber; and it has been found advisable, in order to get a correct idea of what is taking place or what has taken place in the mains, to frequently check the direct readings with readings made after scrubbing the gas. Such observations also enable the gas engineer to judge whether the gas is being scrubbed by tar or heavy drips deposited in the mains, or whether it is picking up hydrocarbons from the mains. If the gas has been cooled to a low temperature, as it might be in passing through an exposed main (as under a bridge), and afterwards warmed up in the ground, as previously stated, we would expect the hydrocarbon vapour dew point to be higher than the water vapour dew point. If the hydrocarbon vapour dew point is lower than the water vapour dew point, it would indicate contact of the gas with a deposit of tar or heavy drip oil.

The practical application of this instrument in gas distribution practice is well defined. Owing to its low specific heat, the gas flowing from the works quickly reaches the temperature of the surrounding earth. The gas engineer, knowing by the instrument to what extent the hydrocarbon vapours have been dropped, and what the consequent fall in candle power will be, is capable of anticipating the reduction in candle power by raising the candle power of the gas going into the holder.

Cooking-Stove Grease Remover.

A gas undertaking in these days has to devote money and labour to all sorts of occupations that were undreamed of (say) a quarter-of-a-century ago, before the consumption and uses of gas had increased in the extraordinary manner that the period mentioned has witnessed. But of all the work that the employees in the outdoor fittings departments have to do, the most filthy and uninteresting is the cleaning of returned, neglected gas cooking-stoves, with their outer greasy coating and their inner plates caked with time-collections of burnt grease. Special provision has to be made in works with a large cooking-stove connection, to deal with this outcome of neglect; and much time and expense are involved in the work of renovation. Go through the fittings shops of any gas-works; and the men least to be envied are those who are engaged on this work. Clark's Lead and Colour Works Company, of Reading, have come forward, to assist in saving time, labour, and expense in this work, with a composition for which they have registered the title of "Clark's 'Gascolite' Grease Remover," by means of which grease is readily removed from both inside and outside the stoves, and burnt matter on the enamelled plates is cleared off, leaving the plates in excellent condition. All that has to be done is to apply the grease remover with a brush evenly over the surface of the plates or parts to be treated. Then leave the stove for some three or four hours, and wash off with cold water. The work is simple enough for any lad to do; and the result, testimony tells us, is very effective. A mere mention of such a useful preparation is sufficient to ensure a trial.

Midland Association of Gas Managers.—We learn from Mr. C. Meiklejohn, the Hon. Secretary, in a preliminary notice, that the spring general meeting of the Association will be held at West Bromwich on Friday, the 29th inst.

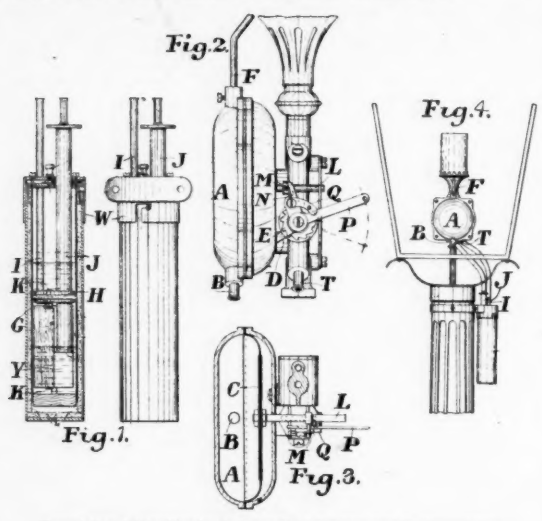
REGISTER OF PATENTS.

Automatically Lighting and Extinguishing Gas-Lights.

TOURTEL, J. M., of Chiswell Street, E.C., and MEALING, W. R., of Twickenham.

No. 7197; March 26, 1907.

This invention relates to apparatus for controlling gas-lights at a distance by temporarily increasing the pressure in the mains. It refers particularly to the controller used to govern the operation of a diaphragm, liquid-sealed bell, or the like. The controller is of the kind in which liquid-containing chambers are employed, one of which is connected to the gas supply, and another is open to the atmosphere—the chambers being connected by an opening or tube. When the gas pressure is increased beyond the ordinary maximum, the liquid is forced from one chamber to another, and uncovers or unseals a pipe or outlet through which the gas (under pressure) passes to the diaphragm or bell, and effects the desired turning on or off of the gas.



Tourtel and Mealing's Automatic Lighter and Extinguisher.

Fig. 1 shows the controller. Fig. 2 is an elevation of the diaphragm case attached to the supply-pipe of a burner. Fig. 3 is a sectional view with the diaphragm in position under gas pressure. Fig. 4 shows (on a reduced scale) the top of a gas-lamp column having an incandescent burner and diaphragm with the invention applied.

The controller consists of a case with a cover held by a bayonet catch. A tube G (preferably of glass) is arranged in the case and secured to the inner cap by plaster of Paris, protected by packing, and closed at its lower end by a plug. A partition H, consisting of an elastic disc pressed between two metal plates, divides the tube into an upper compartment, open to the air, and a lower compartment. The inlet-tube I passes through the partition into the lower compartment, which is connected by a liquid tube K with the upper one. The sealing-tube J passes through both compartments, and is provided with a milled nut to facilitate raising or lowering it through the partition for the purpose of adjustment.

When abnormal or extra gas pressure is applied, it enters the lower chamber by the tube I, and forces the liquid up the tube K into the upper chamber; thus unsealing the lower end of the tube J, so as to allow gas to pass through the tube to the diaphragm and operate it.

The filling plug closes a hole in the cover W, and below it a corresponding hole is provided in the cap to serve for filling, and also as an air-hole; the air being allowed to pass through the packing and through a hole in the bottom of the case. Screws are provided to hold the cover and the cap together, and to squeeze a leather joint which has filling and air passages in it. The block Y, of wood, china, or other material, in the lower chamber is for the purpose of reducing the liquid area, so that the movement in level of the fluid is more rapid in the lower chamber than in the upper one.

In figs. 2 and 3, A is the diaphragm case having an inlet-pipe B, outlet F, and elastic diaphragm C. A spring D controls the double-armed lever P N, and through the arm N presses against a pin M on the diaphragm rod L, and holds it back in the case until the pressure against the diaphragm C overcomes the spring and thrusts out the rod. When this movement takes place, the pin M pushes against the arm N of the lever P N, and turns it as shown by dotted lines. The arm N has a ratchet or dog Q, the pin of which engages with a notched wheel E fixed to the tap which supplies the burner. At each outward movement of the rod L and the lever P N, the gas-tap is given a partial turn, which, owing to the construction of the tap, is sufficient to alternately turn on and off the gas, or to turn it up or down. A pipe T is arranged on the gas-supply side of the burner-tap, and is connected with the inlet-pipe I of the controller.

In fig. 4, the apparatus is shown attached to a gas-pillar by a metal strap connected to lugs.

Charging Vertical Retorts.

GLOVER, S., of St. Helens, and WEST, J., of Manchester.

No. 7534; March 28, 1907.

This invention was fully illustrated and dealt with in last week's issue of the "JOURNAL"—p. 218.

Fabric for Gas-Mantles.

SECKEL, G. J., of Enschede, Holland.

No. 7540; March 28, 1907.

Seckel's Gas-Mantle Fabric.

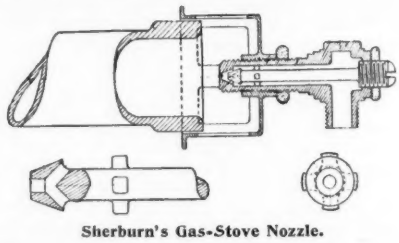
This fabric for incandescent gas-mantles is so made that a portion of the woven threads are longer than others, "so that it is sufficiently firm and keeps its form well; but a portion of the threads are so loose that the gas can pass through readily, and in this manner a large surface is presented to the gas." It is also possible, says the patentee, to put a comparatively great number of threads in one place without at all blocking the passage of the gas. Either the warp or the weft threads, or both, can be made as shown; and the process can, if desired, be so applied that the part of the fabric which is to form the head or top of the mantle remains flat.

Burners for Gas-Stoves.

THE RICHMOND GAS STOVE AND METER COMPANY, LIMITED, and SHERBURN, W. H., of Warrington.

No. 7583; March 30, 1907.

This invention has reference more particularly to the regulation of the supply of gas as well as air to gas-heating burners—to provide means, of the "needle" type, by which the regulation may be effected with the assurance that the jet or jets of gas "will be delivered in a true central and parallel direction and position, under all positions of adjustment, in relation to the mixing-tube."



Sherburn's Gas-Stove Nozzle.

The regulating "needle" device (as shown) comprises a thin stem adapted to be screwed in and out of the gas supply or nozzle-tube of the burner. The means of operating it are at the back end of the nozzle-tube; while the other end, which operates in connection with the gas-nozzle end, is in the form of a plug working in connection with it, which is correspondingly formed—say, both tapered. The plug or coned end of the needle stem is adapted to fill the hole in the nozzle; but the needle stem plug is provided with small central holes, which pass axially through it, and by other holes to the outside of the stem. The gas in the nozzle-tube (which is larger than the needle stem) can pass by these holes to the small inner hole in the needle end or plug; and this hole, being always open, "provides, under all circumstances, a minimum supply jet of gas."

At or near this end of the needle stem, guide-pins or projections are provided on it, which work in connection with the internal surface of the gas-nozzle tube, and by them the stem is kept in a true central position, and the jets of gas discharged must be parallel with the mixing-tube, and in the centre of it. Hence "an economical and effective consumption of gas will be accomplished."

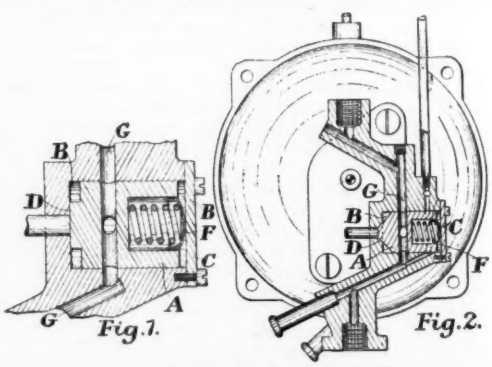
When more gas than the minimum flow is required, the needle stem plug is revolved, so as to withdraw it more or less out of the gas-tube nozzle; whereupon the minimum flow is supplemented with an extra flow around the needle end plug and the nozzle end.

Gas Tap or Cock.

TOURTEL, J. M., of Chiswell Street, E.C.

No. 10,958; Oct. 25, 1907.

This tap is designed for use with gas-controlling apparatus of the kind in which a diaphragm or liquid-sealed bell is moved by a temporary



Tourtel's Gas-Cock.

increase in the pressure of the gas—the movement of the diaphragm or bell being employed to turn the plug of the tap.

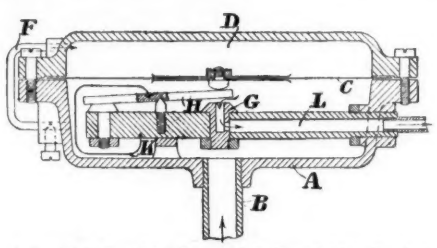
Fig. 1 is a sectional view of one form of the tap, and fig. 2 shows a slightly modified, but otherwise similar, tap attached to the diaphragm case of an automatic gas-controlling apparatus. Here A represents the plug of the tap, which in fig. 1 is reduced at its inner end so as to minimize friction. The plug is rigidly connected to the spindle of the diaphragm, by which it is rotated; and it is fitted in the chamber B, the outer end of which is closed by a cover C. The coil spring is arranged within a recess of the plug, and bears against the cap F—of round shape, for the purpose of having only a small bearing on the cover. G are the gas-passages. The plug shown is of two-way form. In fig. 2, the end bearing or seating of the plug is of taper form; but the beat against which it bears is small, as shown at D. [The additional gas passages and the diaphragm case shown in fig. 2 form no part of this invention, but are included in the drawing to more clearly show the adaptation of the improved tap to a gas-controlling device.]

Lighting and Extinguishing Gas-Flames from a Distance.

AKTIEBOLAGET GASACCUMULATOR, of Stockholm.

No. 15,047; June 29, 1907. Date claimed under International Convention, Aug. 18, 1906.

This is an apparatus for lighting and extinguishing gas-flames from a distant point by raising and lowering the pressure, and is characterized in that its action is independent of the amount of pressure and of common variations of pressure which are relatively slowly transmitted, and is dependent upon sudden variations of pressure established at the works by intentional variations of the load of the holder.



A Swedish Gas-Lighting and Extinguishing Device.

If gas under pressure be conducted through the conduit B into the chamber A, the diaphragm C will be pushed upwards from the position shown. The counterbalancing action of the weight of the diaphragm on the plate H, by which the valve was closed, is thus destroyed, and the spring opens the valve, so that the parts assume the position shown. The gas flows through the conduit B from the gas-mains to the chamber A, and from the latter, through the valve A and pipe L, to the burner; and, as the burner is provided with a pilot-jet, the gas is lighted as soon as it is allowed to flow through the valve G. The gas pressure prevailing in A is transmitted through the pipe F to the chamber D, so that the same pressure prevails on both sides of the diaphragm, which does not therefore change its position.

If the gas pressure in the conduit B, and thus also the chamber A, changes owing to variations of consumption—for example, in the mains to which the conduit B is connected—such variations of pressure (which are relatively small and take place relatively slowly) will be gradually transmitted to the chamber D. At such slow variations of pressure, the diaphragm will remain at rest. But if it be required to extinguish the gas and, for this purpose, the pressure in the main is suddenly diminished—for example, by suddenly diminishing the load of the holder at the gas-works—the pressure in the chamber will be suddenly diminished; and as this diminution of pressure is only gradually transmitted through the pipe F to the chamber D, a difference of pressure prevails during a certain period of time on the two sides of the diaphragm C, owing to which the diaphragm moves downwards against the action of the spring K, and moves the valve plate H out of the position shown to a position in which it closes the valve G and shuts off the gas supply through the pipe L to the burner.

Washing-out Ammonia from Coal Gases.

FELD, W., of Zehlendorf, Germany.

No. 27,567; Dec. 13, 1907. Date claimed under International Convention, May 29, 1907.

In washing out ammonia from gases obtained from the distillation of coal, by means of saline solutions or acids, the patentee points out that a disadvantage is that the solutions of ammonium salts obtained are diluted by the water contained in the gases. In a recent process, the mode of operation is such that hot tar is first separated, and thereupon the ammoniacal water condensed by cooling, during or after the tar separation, is supplied again to the hot gas in a contrary direction; the water being, if needed, heated by the application of extraneous heat, so as to return to the gas the ammonia dissolved in the water of condensation. Although this process can be easily carried out, it presents the disadvantage that, with gases containing much water, a large quantity of heat has to be supplied to obtain the object in view.

To obviate these disadvantages, he proposes to utilize the tension of vaporization of water or the saturation tension of the gas as regards steam; the process, according to the present invention, enabling, by the aid of the carbon dioxide contained in the gases, the ammonia to be washed out by means of saline solutions, or of acids, without the resulting ammonium salt solutions becoming perceptibly diluted by the water contained in the gases.

The process utilizes the property of gases to absorb a quantity of water, which quantity increases as the temperature rises. Conversely, a gas which is saturated at a given temperature with water parts with this water as soon as the gas is cooled below the saturation temperature—"the dew point of the gas." If a gas having a dew point of about 80° C. be mixed with a gas having a dew point of 15° C., the dew point of the gaseous mixture obtained is comprised between 15° and 80° C., according to the amount of the admixed gas of lower dew point. It is therefore possible to cool this gaseous mixture considerably below 80° C., according to the amount of gas admixed, without any separation of water taking place. By regulating the supply of gas having a low dew point, the dew point of the gas containing ammonia can, it is said, be easily lowered, to the extent required to obtain, with the acid or saline solution, a perfect washing out, without the ammonium salt solution being much diluted.

The gas is first (by washing in accordance with any suitable process) deprived of those tar products which, according to the tension of vaporization of the tar products, condense above, or a little below, the dew point of the gas—care being taken that no water, or only a little, separates. The gas resulting from the tar wash is then mixed with such an amount of a gas having a lower dew point, that the dew point of the gaseous mixture lies below the temperature at which it is desired to wash out the ammonia. At the same time, as the dew point of the original gas as regards water is decreased, its dew point as regards the tarry products still contained therein is also decreased. If the gas utilized for dilution be colder than the original gas, the temperature of the gaseous mixture will be lowered accordingly. It is, however, possible by the amount of additional gas, to also keep the temperature in this case so high that, in washing out the ammonia, only a slight (if any) condensation of water and tar products takes place. It is preferable to use for dilution a part of the gas already purified and deprived of water by cooling or other suitable means.

The gaseous mixture obtained with the lowered dew point is then treated with an acid—such as hydrochloric acid, sulphuric acid, sulphurous acid, or the like—or with an acid or neutral saline solution for washing out the ammonia. In the latter case, the combination of the ammonia takes place with the simultaneous utilization of the carbon dioxide, which is almost always present in the distillation gases. The following compounds are preferably used: Chlorides, sulphates, nitrates of alkalis, of alkaline earths, of magnesia, manganese, and zinc—for instance, solutions of sodium nitrate, magnesium chloride, calcium chloride—or suspensions of burnt or unburnt gypsum. The temperature of the washing process is regulated according to the nature of the washing medium—in the case of sodium salts, it must be much lower than when calcium compounds are used.

If, in the separation of tar products preceding the ammonia washing, some ammoniacal water should condense, it is possible, if its amount be small, to add the water to the washing medium. The dilution of the gases may also be so effected that a suitable amount of water is removed from the gas in washing the resulting ammonia solution. Lastly, the ammonia may be expelled from the condensation water by means (if needs be) of an addition of lime, and returned again to the gas.

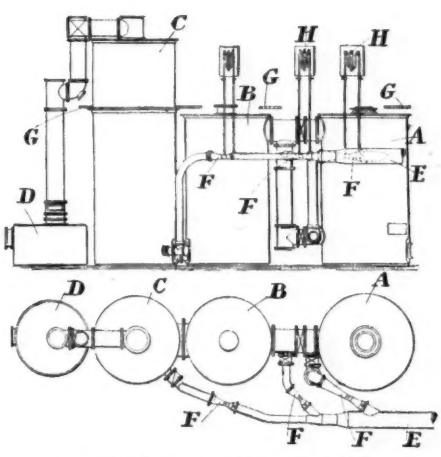
After the ammonia has been entirely washed out of the gas, the gaseous mixture is preferably cooled down to the temperature of the admixture gas; thereby condensing the water, together with the tar products in the original gas. The tar products can be fractionally separated by any suitable process.

Water-Gas Apparatus.

RUSBY, J. M., of Philadelphia, U.S.A.

No. 28,181; Dec. 21, 1907. Date claimed under International Convention, Jan. 31, 1907.

The principal object of this invention is "to provide means for definitely controlling the quantity and quality of the gas produced;" the attendant being "enabled to introduce a definite volume of air during each blow—regardless of fire and other conditions in the generating apparatus—so that during the successive runs or gas-producing periods, the apparatus will be in any definitely desired condition of heat, and thus the introduction of oil and steam or the gas-making process, as a whole, is effected under such conditions that the various steps in the gas-making process which are productive of the best results may be accomplished, and the apparatus worked most economically and efficiently."



Rusby's Water Gas Making Regulator.

A is a generator, B a carburettor, C a superheater, and D the seal of the eduction end of the apparatus. These are the ordinary parts of a water-gas plant, and "they are appropriately interconnected and provided with oil and steam connections which are too well understood to require description or illustration." E is a pipe from which air is

conducted to the various parts of the apparatus by branch pipes. F is a "Venturi" tube, which affords means "for indicating the volume of air per second or other unit of time passing through it by reason of the different pressures which simultaneously exist within, respectively, its most contracted area or throat and its larger area on each side of the throat; and since this indication is continuous, it enables the attendant at a glance to know the volume of air passing to the apparatus."

"In order to operate water-gas apparatus most economically and efficiently," the patentee points out, "it is desirable to perform each of the steps of the process in the manner that has been ascertained to be most efficient. For instance, at each blow a predetermined volume of air should be introduced; otherwise the apparatus will not be properly heated for the reception of a predetermined quantity of oil and steam. The condition of the fire will affect the volume of air passing through it under a given pressure—in some cases permitting too large a volume of air to pass, with the result that fuel is unnecessarily consumed and the apparatus probably too highly heated, and in other cases precluding the passage of sufficient air, in which case the requisite heat is not attained for carrying out the gas-making process in accordance with the pre-arranged plan. The volume of gas made is substantially proportional to the quantity of air introduced, provided the proper quantity of steam and oil are supplied."

Pressure-gauges, provided with pet cocks and with valves, are arranged where the attendant can readily see them—for example, above the operating floor G. H are scales (by which the gauges can be read) arranged so as to be slidably mounted so as to adjust their position in respect to the fluid level in the gauges.

APPLICATIONS FOR LETTERS PATENT.

8108.—Wilson, J. W., "Gas-ovens." April 13.
8120.—Sutton, C. J., and Rudd, J., "Gas-regulators for incandescent burners." April 13.
8121.—Keith, J. & G., "Compressors." April 13.
8172.—Hands, G., and Breeden, F., "Inverted lamps." April 13.
8186.—Wellington, S. N., and Everest, A. S., "Manufacture of gas." April 13.
8220.—Goldspink, G. E., "Gas-meters." April 14.
8241.—Preston, J. T. E. & R. W., "Quenching coke." April 14.
8321.—Le Compagnon, A., "Gas-turbines." April 14.
8370.—Ries, H., "Retort-furnaces." April 15.
8383.—Ogden, J. E. L., "Valves." April 15.
8386.—Akt.-Ges. Brown, Boveri, & Cie., "Gas-turbines." April 15.
8397.—Chavanne, I. A., "Gas-generators." April 15.
8408.—Thompson, W. P., "Gas apparatus." A communication from the International Amet Company. April 15.
8438.—Hibberd, C. E., "Coin-freed meters." April 16.
8470.—Bryce, W., "Pipe coupling." April 16.
8473.—Kemp, C. W., "Gas-pendants." April 16.
8508.—Dunal, C. F. R., and Masse, R., "Treatment of coke." April 16.
8524.—Botley, C. F., and Cutler, S., jun., "Gas-generators." April 16.
8526.—Mackenzie, J. W., "Gas-engines." A communication from D. A. Poe. April 16.
8536.—Keeble, A. J., "Utilization of peat for the manufacture of combustible gas and ammonia." April 16.
8566.—Neue Kramerlicht G. m. b. H., "Protectors for incandescent bodies." April 16.
8573.—Prosser, H. R., "Incandescent burners." April 16.
8578.—Jowett, J., "Treating coal." April 18.
8613.—Van Praag, D. J., "Burner for stoves." April 18.
8626.—Winn, C., "Joints for flexible metallic tubes." April 18.
8639.—Jones, S., and Bennett, A. H., "Anti-vibrator." April 18.
8655.—Baglin, C. A., "Coke loading." April 21.
8690.—Sparks, E., "Opening and closing gas cocks or valves by variation of pressure in mains." April 21.
8715.—Pettibone, H., "Manufacturing gas." April 21.
8729.—M'Ilhenny, J. S., "Treating gas." April 21.
8730.—Jensen, P., "Automatic gas ignition and control." A communication from L. G. Bartlett. April 21.
8731.—Preston, E. J., and Cordrey, H. C. F., "Tapping mains under pressure." April 21.
8746.—Auger, G., "Incandescent filaments." April 21.
8860.—Demeur, A., "Acetylene generators." April 23.
8862.—Gunning, J., "Time-controlled gas-tap." April 23.
8867.—Penrose, W. R., "Generator for acetylene." April 23.
8920.—M'Whirter, W. & A. C., "Telephone circuits for use in combination with automatic apparatus for indicating or recording at a distance changes of level of water or other fluids in reservoirs or gas-holders." April 24.
8927.—Hawley, W., "Grids for purifiers." April 24.

Gas-Meter Testing in Middlesex.—During the year ended the 31st of March, the expenditure in connection with the gas-meter testing-station of the Middlesex County Council amounted to £1519 5s. 6d. The fees received or due amounted to £2527 4s. 6d.; leaving a balance of £1007 19s. in favour of the Council. Since the Council adopted the Sale of Gas Acts eight years ago, 596,493 meters have been submitted for testing. The total amount of fees charged in respect of them was £18,061; the fees ranging from 6d. for a 5-light or smaller meter upwards, according to size.

Liverpool Gas-Fittings Company, Limited.—In the report which the Directors of this Company will present to the proprietors at the annual meeting on the 13th inst., they state that the net profit for the year ending the 31st of March last is £1508. Adding £117, the balance remaining after paying last year's dividend and bonus, makes a total of £1625 standing to the credit of the profit and loss account. The Directors recommend that a dividend be declared for the year at the rate of 10 per cent., with a bonus of 1s. per share (free of income-tax), after payment of which there will be a balance of £125 to be carried forward.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Coal Mines (Eight Hours) Bill.—Funds for the Agitation.

Sir,—It must be from the want of an application that the sinews of war have not been supplied to carry on the very necessary, and I believe effective, agitation against the above-named measure. The Gas Companies' Protection Association never had such a gathering of members as assembled about two months ago to oppose the Bill. The Institution of Gas Engineers also took up the matter warmly, with the result that a thoroughly representative joint deputation from the gas companies of the kingdom waited on Mr. Gladstone, as reported in the "Journal;" and a pamphlet, giving the report in full, was sent to gas companies at your suggestion. Since then very effective agitation has been carried on by a Committee representing the shipping, railway, gas, and other industries; but this cannot be done for nothing.

The gas industry, I am sorry to say, has not done its fair share in the matter of subscriptions; for I have been informed this morning that only the Gaslight and Coke, the South Metropolitan, and the South Suburban Companies have subscribed. I therefore put it to all those earnest men who formed the deputation, and to many others equally earnest who could not attend, who realize that the increase in the cost of coal which the Eight Hours Bill will cause will be disastrous to the industry of the country, to see that the needed funds are supplied. I feel sure that this would already have been done; but it seems to have been nobody's business to make applications. I do not know the amount of the Gaslight and Coke Company's subscription, but I am sure they, equally with the South Metropolitan Company, have done their part. As an indication, I may say that the South Suburban Company's subscription was thirty guineas (£31 10s.). As Mr. D. Milne Watson, the General Manager of the Gaslight and Coke Company, is a member of the Executive Committee, it will be convenient to send subscriptions direct to him; and may I ask for a prompt response?

George Livesey.

South Metropolitan Gas Company,
709, Old Kent Road, S.E., April 30, 1908.

P.S.—It was this Committee who did good work in the Peckham election and elsewhere.

The Nuneaton Gas Company and its Affairs.

Sir,—The requisition signed by Mr. William North, late of Stourbridge, Mr. Fred North, the representative of a well-known firm, and others, calling upon the Directors of the Nuneaton Gas Company to convene an extraordinary general meeting for certain purposes, having been executed with the result already known, I should like to be allowed to point out to any of your readers interested the important *impersonal* bearing that this matter has on the industry generally. I recollect your attitude in a small, though somewhat similar case, which you referred to in the "Journal" for March 7, 1905, under the heading "Shareholders' Criticism." Indeed, in matters of this kind, unless strong comment be made by our technical journals, individual workers who may do their duty may be upset by members or representatives of firms trading among us holding shares in our various undertakings.

In corporations dealing with town affairs, a member is not allowed to vote on any matter in which he is particularly interested. It seems to me that any shareholder in a gas company becomes particularly interested when he, or his firm, is in a position to supply such gas company with their wares; and a similar rule should apply. Where there is delicacy of feeling, such a sense would preclude any question of the kind cropping up. I know some of the arguments that can be raised on the other side. Is a man having money to invest in a free country to be debarred from investing where he wills, even if he invest with the express purpose of doing business with the company concerned? And has a man no right to follow up his money? If the action be none too nice, it is only a commercial one, and so on. Such arguments as these must be wrong. Let me state the position here as I understand it.

Of course, I cannot attribute motives for Mr. Fred North's action in this matter; nor can I say whether the dual capacity he occupies as a representative of a firm trading with gas companies in meters, cookers, &c., and as a shareholder of the Nuneaton Gas Company has anything to do with his attack. But to my mind it looks like it. For instance, some years ago all the meters and cookers required by this Company were purchased through Mr. North; and his firm has been paid over £1000 in a year by us. In later years much less business was done, until now no business whatever is done. On one occasion I wrote to Mr. North to the effect that my ideas of business conduct would not allow me to receive him one minute as his firm's representative, and the next as a shareholder at the general meeting—and a discontented one at that; and, therefore, there would be no necessity for him to call on me in the former capacity again.

The objects of the extraordinary general meeting that Mr. North called were set forth in detail: "That this meeting of shareholders appoint a Committee who shall have full powers to investigate the affairs and accounts of the Company, and for that purpose to inspect the works and books and employ experts for all necessary purposes; to inquire into the reason of the reduction in the dividend, and the increase in the price of gas to the consumers; to inquire into the nature of the agreement between the Directors and the Manager (Mr. George Helps), which apparently permits him to devote a large portion of his time to outside work, some of which is to the detriment of gas companies; and to report the result of their investigations to a further meeting of shareholders."

It is now known what happened at the extraordinary meeting. I fear no inquisition by able and honourable men; and I challenge Mr. North or any other engineer to show any really bad feature in any balance-sheet over the last ten years, that the particular circumstances do not fully account for.

The grievance that it seems to me the industry has in this affair is that two members of the Gas Institution and of the Midland Association

of Gas Managers should be the prime movers in an attack, the nature of which must be apparent to all.

When I had the honour to address the Midland Association of Gas Managers in 1904, I referred to the practice of representatives of firms supplying goods being shareholders in gas companies. When it leads, or appears to lead, to such results as in the present instance, I repeat it is a most insidious practice, and one which should not be tolerated for an avoidable moment. The industry has the staying of this in its own hands. Cease to do business with such people!

Under the circumstances, and with all respect to those concerned, I denounce the practice of representatives of firms doing business with us becoming shareholders in our companies, as a menace to the gas industry; and I call upon every man who loves truth and uprightness, honour and integrity, to make a stand against such practice, by discontinuing to trade with firms who seek, or appear to seek, business through such channels. Those managers who will not take such a stand are conniving at a system which bids fair to undermine the stability of our office. There can only be one side for every man who has any self-respect.

I appeal especially to those men who are in the ranks of the profession who manage small works and make their living by their industry. Are we to have open doors in our Institution to men who, having been given opportunities in their day to make a position, and having made it, use it to prevent others receiving similar generous treatment?

I cannot think that I am the only one subjected to this sort of thing; and I shall, therefore, be glad to hear from any engineer interested, or whose experience coincides with my own, with a view to the evil being attacked by definite and united action.

Nuneaton, April 28, 1908. GEORGE HELPS.

SIR,—I do not know whether or not you are reporting the Nuneaton Gas Company's meeting in the "JOURNAL." If you are, and can find space, I should be glad if you would print my remarks in proposing the resolution. I send an exact copy, including the remark *re* leakage which was stated to be incorrect.

Old Swinford, Stourbridge, May 1, 1908. FRED. G. NORTH.

By urgent request of a number of shareholders, I associated myself with the calling of this extraordinary meeting, the terms and notice of which you have received and heard. That the affairs of the Company are going from bad to worse, needs no proof, the knowledge that the dividend has dropped 2⅛ per cent., representing a loss in capital value on the market of many thousands of pounds, and the rise in the price of gas on what was already a high rate for a town of the size and position of Nuneaton, speak for themselves. Why should these last resorts of a gas company be adopted? The answer is simple—because the working account does not show sufficient balance of profit to maintain the *status quo*. Then why is the balance so small? Explanations have been asked from the Directors at successive board meetings; but only lame replies have been received. I therefore venture to suggest (though the means of ascertaining exact facts are not at my disposal) that the practical working is not good. The results obtained are not commensurate with the elaborate and costly plant at the disposal of the management. The latest figures obtainable are those for the year ended March 31, 1907. The object of a gas-works is, primarily, to make gas. The information given at the last meeting was that only about 10,500 cubic feet per ton of coal carbonized were produced; and the coke sold per ton of coal was only about 8 cwt. The cost of coals into stores was 12s. 2d. per ton. Is this making the best of materials and plant? I say, No. Makes of 11,500 to 12,000 cubic feet are common. Leamington sells over 11,000 cubic feet per ton of coal used. Then with these attenuated figures to deal with, last year the unaccounted-for gas was 14 per cent., and the previous year I believe about 20 per cent. How can a gas company conducted on these lines, with a very expensive staff, expect to earn large profits? I stated at the last shareholders' meeting that your neighbours at Hinckley earned £2000 more on the year—£5415, against £3563. I could multiply instances of this kind; but this is next door, is a rather smaller concern, has a 3d. railway rate above ours, and the price of gas is about the same. In the one case we have constant practical supervision, always in touch with the works and the consumers; and in the other, intermittent supervision, fitted in apparently to employ the spare time of your Engineer, who does not even reside within the limits of your gas supply. No doubt this is all within the four corners of the agreement, and therefore the blame must be attached to the Directors who entered into such an agreement. I am aware that innuendos about motive have been freely scattered and taken up by an inspired Press; but as far as I am concerned, I have always criticized from a purely business point of view as a shareholder. My father's opinion has also been given at our shareholders' meetings; and the opinion of others well qualified to judge has been that the affairs of the Company have not been managed as they ought to be. The general balance-sheet is about the most hopeless within my knowledge—not a single stiver in any reserve fund, and a debit balance at the bank of £7693 3s. 10d., though the capital account is only £337 5s. 4d. overexpended. Then there is that ghastly item of £2500 debentures in the Ecliptic Fittings Company, Limited. We were informed at the last meeting that there is no freehold; therefore the security is simply on stock, in case the Company fail. Being a Limited Company, and the shares being probably fully paid, the individual members, however well meaning, have no responsibility to us. Then, if this fittings business (illegally entered into, in my opinion, and in any case entered into without consultation with the shareholders) was good, why sell it? Then, how was the valuation of our business arrived at? Was an impartial person employed? We know not; the Board entered into this venture and parted with it without any explanation to the shareholders. We ought to have a separate balance-sheet giving full particulars of this speculation from start to finish. In stating from time to time in shareholders' meetings the opinions I hold, I have taken the only honest course; that is the place to say these things. Of course, this means that those in power do not like being criticized, and resent the criticism; but why the terms of the requisition for this meeting should be advertised abroad, bringing the condition of the Company before the world, I can only guess. I hope the Board will meet the shareholders' legitimate desires, afford the fullest opportunity to obtain information, and satisfy them as to the stability of the Company and the better working of its affairs in the future.

Sulphate Saturators.

SIR,—Referring to Mr. Pettigrew's letter which appeared in your issue of the 28th ult., I may state that both Mr. Fenner and myself were aware of the existence of Mr. Pettigrew's patent; and the best reply I can make to Mr. Pettigrew's unwarrantable charge of infringement is to quote from our complete specification of patent No. 25,547 of 1906:—

> Hitherto the steam, ammonia, and other gases evolved in the manufacture of sulphate of ammonia from ammoniacal liquor have been distributed by means of a perforated pipe fixed within the saturator or *by means of a hollow belt around the saturator, between the interior of which and the chamber within the belt communication is established at intervals by means of perforations formed through the wall of the saturator*, the steam or other gases passing from the pipe or belt through the perforations.
>
> Now with these arrangements, as the length of the steam and gas admission passages constituted by the perforations is limited by the thickness of the wall of the pipe or saturator, the said passages rapidly become enlarged, with the result that the steam and gases become unequally distributed—a greater quantity passing through the passages near to the supply pipes connected to the pipe or belt than through the others. This leaves portions of the liquid in the saturator more or less quiescent, and causes "local alkalinity," with consequent formation of blue salt, besides which deposits of hard salt which cannot be removed by the ordinary means of discharging, accumulate, and frequent stoppages for the cleaning out of the saturator become necessary.

The above italicized lines refer specifically to the patent claimed by Mr. Pettigrew.

Gas-Works, Poplar, E., May 1, 1908. P. E. WILLIAMS.

Light Railways in Connection with Gas-Works.

SIR,—I notice in the "JOURNAL" for the 14th of April (p. 87), under the heading "Points from Presidential Addresses," that the writer refers to the address by Mr. Wilkinson, of Harrogate, and says the system of light railway from railway to gas-works is preferable to the previously mooted scheme of bringing the works to the railway, and using the present works as storage only. I wonder if the writer of the article tried to find out whether the system now being carried out is really the better one. I am glad if this is the case. However, being in Harrogate at Easter, I took the opportunity of asking a few questions; and if the figures given me are correct, I am unable to see the great advantage claimed. I understand the present system of carting coal to the works costs the Company 1s. per ton. If so, I make the cost of working as under:—

By Light Railway.		*By Cart.*	
Cost of light railway . .	£13,000	Cost of carting 27,000 tons, at 1s. per ton	£1350
Locomotive and waggons .	1,000	Balance in favour of carting	500
Total	£14,000		
Interest on above, at 5 p. ct., and repair and depreciation at 5 p. ct.	£1400		
Cost of labour, fuel, and sundries, working loco., waggons, &c., 4d. per ton on 27,000 tons	450		
Total per annum .	£1850		£1850

S. B. C.

May 1, 1908.

A Gas Company's Trench and an Accident.

SIR,—Would you allow me a small space in the next issue to correct your report under the above heading of the accident in this Company's district of supply which appeared in your issue of April 28 (p. 243)?

(1) This accident did not occur opposite the excavation made by the Gas Company's men, but after the van had passed and been drawn again on to the permanent road some 20 yards distant from the extreme end of the trench. (2) The 9 feet pathway and 2 feet roadway had been made into a temporary roadway during the execution of the work, over which very heavy traffic had been passing for some time previously. The road being very narrow at this point, it was impossible to arrange for a greater width than about 7 feet if the only alternative scheme had been adopted.

The above explanation, I think, should be made to qualify your report.

Dorking Gas Company, May 2, 1908. SAMUEL CARPENTER.

Gas Poisoning Case at Kingston.—At an inquest on the body of a Kingston newsagent named Brinkman, the Jury returned a verdict of "Accidental Death." Deceased was found dead in bed, with the room full of gas, and the bracket hanging loose from the wall. The doctor who was called said it was quite possible that the bracket had come asunder when the gas was turned out; it was very loose fitting. It was reasonable to suppose that a man slightly deaf, with little sense of smell, and feeling tired after a long day, might have carelessly pulled the bracket down when turning out the light, and not noticed the escape of gas.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Audenshaw Urban District Council Bill [Lords], Briton Ferry Urban District Council Bill [Lords], Llanelly Gas Bill [Lords], Pontypridd Water Bill [Lords], South-West Suburban Water Bill.

Bills reported: Garw and Ogmore Gas Bill, Huddersfield Water Bill [Lords], Southwell District Gas Bill.

Bills read the third time and passed: Blaydon and Ryton Water (Transfer) Bill, Draycott Gas Bill, Gosport Gas Bill, Leicester Corporation Bill.

PADIHAM URBAN DISTRICT COUNCIL BILL.

Police and Sanitary Committee of the House of Commons.

(*Mr.* CORRIE GRANT, *Chairman.*)

The Police and Sanitary Committee of the House of Commons had before them last Thursday the Bill of the Padiham Urban District Council, the primary provisions of which relate to an extension of the gas and water supply.

Mr. WEDDERBURN, K.C., who appeared for the promoters, outlined the general provisions of the measure, and introduced his subject with a statement as to the situation of Padiham, its population, and financial position. He said it was an urban district, not very far from Burnley, covering an area of some 980 acres with 3084 houses, and a present population of about 14,000. The Bill was divided into ten parts, the second consisting of 18 clauses having reference to gas, and the third of 15 clauses concerning the water supply. In respect of the gas proposals, the Council were asking for £45,000. The Local Board acquired the gas-works in 1876, cleared off the loans of the Gas Company, and paid for the undertaking by perpetual annuities. When it was bought, the property consisted of certain leasehold lands, works, and cottages. The Local Authority afterwards acquired various additions to the property, the larger portion of which were freehold; but there was one part which was held on lease for 999 years, at an annual ground rent of £15. All this, however, was in the centre of the town; and it was now proposed to put up other gas-works on land acquired in 1887, which was away from the town. One of the first things they proposed to do was to remove all the gasholders which were now in the town to the site outside. The change had long been necessary; but the work had been delayed for considerations of economy, as the Council had been put to great expense in connection with their water undertaking. It was proposed to retain part of the site of the old works for public buildings, and sell the rest; but some of the old plant would be retained for the new site. As to the cost, details would be given by the Council's Gas Engineer (Mr. A. J. Harrison); but the total amount asked for by the Bill for gas purposes was, as he had stated, £45,000. Of this, it was proposed to spend at once £25,000 for works, and to hold over £10,000 for future extensions. They also intended to spend £5000 on the distributing plant, including extensions to Simonstone and beyond to Read, and to Sabden to the north. There would be, in addition, some £5000 required for meters and cookers. As to the necessity for the work, he said the present gas production was 70 million cubic feet per annum, the whole of which was consumed, with the exception of 3 per cent. allowed for leakage. This production was largely in excess of the capacity of the existing purifying plant. The new works would at once furnish 100 million cubic feet of gas a year by an expenditure of £25,000; and they would be capable of increasing their production to 180 millions by a further expenditure of £10,000. It was proposed to extend the Council's limits so as to enable them to supply Sabden, Simonstone, and Read. They had been supplying the last-named place without permission since 1879, in virtue of a bargain made with a manufacturer there, who paid a portion of the cost of laying the mains. The mains to Read had to pass through Simonstone, and therefore they were able to supply that district also without permission. With regard to Read, it was proposed to buy from the Parish Council some of the smaller branch mains which had been laid by them in the side streets, but this would only involve an outlay of about £500. They were asking for power to charge Read and Simonstone 6d. per 1000 cubic feet more than they charged in their own districts; and on the Sabden section they proposed to charge 1s. 6d. per 1000 cubic feet more, because the cost of the new mains to that place would be something like £2500. Their maximum price was 6s., but the actual figure now was 3s.; and in no case would they be able to charge in the outlying districts more than the maximum.

A statistical statement was handed to the Committee, from which it appeared that the result of the past year's gas trading was a surplus of £1000, which had gone to the relief of the rates.

The CHAIRMAN: You apparently lose on your water every year.

Mr. WEDDERBURN said this had been so; and a rate-in-aid had been the result. The heavy charge to the water account was the result of expensive embankment works which had to be carried out.

Mr. *J. C. Waddington*, the Clerk to the Council, then gave evidence in confirmation of the preceding statements.

Mr. *A. J. Harrison*, the Gas Engineer to the Council, also gave evidence, and said it was essential that there should be new gas-works on the fresh site; and, in his opinion, the estimates were reasonable. In answer to the Chairman, he said the works proposed by the Bill would be sufficient to meet the increased demands for gas for thirty years.

The first five clauses were then ordered to stand part of the Bill, and the Committee adjourned.

On Friday, the gas clauses were further considered. Clauses 7 and 8 were passed without controversy. They collectively provide power to purchase, hold, and use patent rights or licences in relation to the working of any invention relative to the manufacture of gas and residual products, and to lay pipes in streets not dedicated to the public. By clause 9, the Council seek to make extra charges for gas supplied outside the district—viz., 1s. 3d. per 1000 cubic feet for Sabden and 6d. for other districts; the extra charge for Sabden being occasioned, as explained by Counsel, by the need for laying additional mains.

Mr. WEDDERBURN, in the course of a conversation which took place on the subject of the extra charge, pointed out that the outside places had not contributed anything to the capital expenditure on the undertaking, nor were they in any way financially liable.

Mr. *Harrison* was recalled, and asked by the Chairman what was the consumption of gas in Simonstone. In reply, he said it amounted to something like 500,000 cubic feet per annum, and they were practically supplying the whole of the property in the district. The consumption in Read was about 4½ million cubic feet. They first supplied Read in 1879, and Simonstone at the same time or soon afterwards. It was six or seven years after the first supply that the consumption in Simonstone was up to the half-million cubic feet.

The CHAIRMAN: How long do you think it will be before the Sabden consumption reaches the estimated 3 millions?

Witness: Almost at once, I should say. Referring to the financial position of the undertaking, witness mentioned that a good deal of the capital expenditure had been met out of revenue.

The CHAIRMAN remarked that such a course could not be regarded as sound finance.

Mr. WEDDERBURN said it might be irregular, but it was better than borrowing money.

The CHAIRMAN asked what would have been the profits for the past three years, after allowing for the charges borne by revenue which properly ought to have been charged to capital.

Witness said he was unable to furnish the particulars off-hand, but promised to prepare a statement for the Committee.

Mr. WEDDERBURN said the object of the Council in making the extra charge to Sabden was to get back their expended capital. They were going to lay two miles of pipe to a village, and it would be some time before they could get a return for the outlay. They were entitled, therefore, to charge more for the gas.

The CHAIRMAN said the Committee had decided to adjourn the further consideration of the point until the Engineer was able to furnish the information for which he had asked.

Clause 9 accordingly stood over.

The Committee then went rapidly through the following clauses to clause 19, and passed the whole of them.

Clause 10 provides for the supply of gas by prepayment meters, and stipulates that the charge should not be greater than that made for gas supplied through any other kind of meter; that the charge for the meter shall be calculated according to the quantity of gas supplied, but to be not more than 10d. per 1000 cubic feet with fittings, and 1s. per 1000 cubic feet if with a cooking-stove; and that the charge so made shall include the cost of the maintenance and repair of the meter and fittings. Where the consumption in any quarter does not reach 3000 cubic feet, the Council may charge an extra 2s. for the hire of the meter and fittings. Clause 11 relates to the quality of the gas supplied, and prescribes that it shall not be of less than 14-candle power; and clauses 12 to 14 deal with the testing of the gas for quality and pressure. The remaining clauses up to 25, which complete the gas section of the Bill, are of a formal or administrative character; and they were all passed.

It was arranged that Part III. of the Bill, which relates to water, should stand over; and after dealing with the sanitary sections, the Committee adjourned the further consideration of the measure.

UNOPPOSED BILLS.

The Unopposed Committee of the House of Commons had severa Gas and Water Bills before them on Thursday last. Mr. ALFRED EMMOTT presided; the other members of the Committee being Mr. MOON, K.C., Speaker's Counsel, Mr. CALDWELL, and Mr. PHIPSON BEALE, K.C.

Southwell District Gas Bill.

This Bill proposes to incorporate and confer powers on the Southwell District Gas Company.

The representative of the Agents for the Bill (Messrs. Crowders, Vizard, Oldham, and Co.) pointed out that clauses 40 and 41 had been struck out, and a new clause (39A) inserted. The point raised was with reference to an alteration which had been made in the new Model Clause; the Agent saying the Company wanted the word "chartered" accountant inserted for the purposes of audit, as there were no "incorporated" accountants in the district.

Mr. CALDWELL remarked that there was no reason why the Model Clause should have been altered. Could they not have "chartered accountant or incorporated accountant"?

The CHAIRMAN said they must adhere to the words "as a chartered accountant or an incorporated accountant."

The Bill was ordered to be reported.

Camborne Water Bill.

This Bill, which was before the Committee at their last sitting (*ante*, p. 39), came up again for further consideration.

Mr. *Baker*, the Agent, remarked that some discussion had taken place with regard to clause 20; and he asked the Committee to allow the clause to read that a supply of water for domestic purposes should not include a supply for an elementary school. This meant that it would be supplied by meter.

Mr. *Boyce*, on behalf of the Local Government Board, said that the school ought to be in the valuation list. If the Company were ratepayers there, and it was not in the valuation list, they could object.

Mr. *Baker* remarked that it was difficult to ascertain what the valuation of the school was in time to make an appeal. The assessing and rating authority were the Local Authority, who did not care a straw about the Company.

The CHAIRMAN: You mean the Company will have no power to object to this rating?

Mr. *Baker*: It is extremely unusual for one ratepayer to object to the assessment of another ratepayer.

The CHAIRMAN: Your point is that the authority has a direct interest in this matter in getting its water?

Mr. *Baker*: The authority ought to pay the proper value for the commodity.

Mr. *Boyce*: The Local Authority of the borough has nothing whatever to do with it. The Assessment Committee are appointed by the Union.

The CHAIRMAN asked whether there were not some cases where there were Local Acts, and where the Committee were appointed by the local authority and not by the union.

Mr. *Boyce* replied that no other authority could make a valuation for the poor rate. For the purposes of the borough rate, the borough had the power to make their own valuation; but this did not affect the assessment of the poor rate. There was only one authority throughout the country who could assess the poor rate, and that was the assessment committee of the union; and this assessment committee had no more interest, *qua* owner, in the public elementary school than he (Mr. Boyce) had. They had to do their duty for every hereditament in their district. He went on to say that a similar measure was going to be discussed before the Police and Sanitary Committee in the Padiham Bill. He would much like to have the whole thing thrashed out.

The CHAIRMAN: It is a very important point; and I think it would be better to hang this case up a little longer.

Mr. *Boyce*: The only claim they have to this alteration of the general law is because they say that the Assessment Committee do not do their duty.

The CHAIRMAN: At the same time it is hard on the Company, particularly where they make a suggestion that the rating authority, although it may be a different authority to the local authority, has still some direct interest.

Mr. *Baker* said the Assessment Committee were appointed by the Guardians, and the poor rate was levied by the Guardians, and collected by them.

Mr. *Boyce*: The Guardians merely issue requisitions for what they need for Union purposes. The Overseers have to make the rate.

Mr. MOON: It seems an important question. I should like to know how you will set about assessing the value of this school.

The CHAIRMAN remarked that it would be better to await the discussion on the Padiham Bill.

Further discussion then took place arising out of the price charged for the water.

Mr. *Baker* stated that for years past they had been charging 5s. per 4000 gallons; and there was no objection to the Bill. If the price were brought down to 2s., they would be giving the public something at all events.

No amendment was made; and the further consideration of the Bill was postponed.

Garw and Ogmore Gas Bill.

Mr. *Bell*, the Agent, in explaining the objects of the Bill, said the Company was incorporated in 1891. The demand for gas was very much increased in their district, and they were short of capital. Briefly, the objects of the Bill were to raise additional money and to enlarge the present works. All the clauses in the front of the Bill were agreed; and on the suggestion of the Speaker's Counsel, they had adopted further clauses. The old-fashioned auction clauses had been struck out, and the new Model Clauses inserted. Strict compliance had been given to the report of the Local Government Board.

Mr. *E. H. Stevenson* explained to the Committee, by means of a plan, the various works of the Company. In the first place they had put down gas-works in the Garw Valley, and had given a supply of gas. In the last five years, the demand had developed, and they had increased their sales by 25 per cent. It was a mining district, and pits were being sunk in various places. All the people were asking for gas; but the hills were so high and steep that they had decided to go to the foot of the valley and serve gas to the different places under pressure. At present they were supplying some 8000 people; and in the district that was being taken in there was an additional population of 16,000. Their present capital was £25,000, including borrowing powers; and they had expended £15,000. The demand for gas was increasing at such a rate in the Garw Valley that at the end of the year they would be selling 14 million cubic feet; and they estimated that in the other two valleys the supply would be at least 20 millions. So that in a couple of years' time they would be selling 34 or 35 million cubic feet.

Mr. MOON: You have spent £15,000; and on this expenditure you are asking the Committee to give you an additional £65,000.

Mr. *Stevenson*: We shall have 14 miles of new mains.

The CHAIRMAN: What reason have you to anticipate that an enormously increased demand will justify £65,000?

Mr. *Stevenson* replied that the people in the two other valleys would take as much in proportion as those in the Garw Valley; and they had to add to the 35 million feet another 5 or 6 millions for unaccounted-for gas, bringing the total up to 40 millions.

Mr. MOON: You asked in your original Bill for £40,000 capital.

Mr. *Stevenson* remarked that they had no idea then that they would be selling so much gas this year. The leakage, which amounted to 15 or 16 per cent. last year, had been reduced to 6 per cent. They were a maximum-price Company. The maximum dividend was 10 per cent.; but they had never paid more than 6 per cent. For the first five years they paid nothing at all. They were putting down new works, &c., and they would have to fit all the houses with prepayment meters. The new works and piping would cost them some £34,000. The present works would be closed; but the holder would be kept in use.

The CHAIRMAN pointed out that they were asking for £34,000, which would provide them with 15 or 16 million feet of gas over and above the requirements expected in the next two years.

Mr. *Stevenson* said that was gas manufactured; but, roughly, 40 million cubic feet would have to be made to supply 34 millions. Not more than three or four years hence they would have to provide for the manufacture of another 10 millions.

The CHAIRMAN: I do not know how you are going to deal with the capital if you shut up these old works?

Mr. *Stevenson* said they would have to write off the value of the old works. They were charging 4s. 3d. per 1000 cubic feet for gas.

The CHAIRMAN held that they were asking for £10,000 too much; and he reduced the capital by this amount.

The preamble having been proved by Mr. Stevenson, who remarked that the Model Clause had been inserted, the Bill was ordered to be reported.

Huddersfield Water-Works Bill.

The object of this Bill is to make further provision with respect to the discharge of the compensation waters from the Corporation's undertaking.

The Agent for the Bill explained that the main object was to regulate the discharge of these waters into the river at certain periods of the day and night. The Bill was promoted by the Corporation at the expense of the millowners using the river for power purposes.

The Bill was ordered to be reported.

LEGAL INTELLIGENCE.

PROCEEDINGS AGAINST WATER CONSUMERS.

The Question of Empty Houses—Unlawfully Connecting a Service-Pipe.

At the Marylebone Police Court on Monday last week, William Arlidge, of No. 60, William Street, Hampstead Road, was summoned by the Metropolitan Water Board for the recovery of £1 16s. for water supplied at 6 and 7, Leighton Grove, for two quarters, ending Lady Day last. Mr. A. B. Shaw appeared in support of the summons; and Mr. George Kebbell represented the defendant. At the outset of the proceedings, Mr. Kebbell submitted that the summons was bad, inasmuch as it was ambiguous and was in respect of more than one house. Mr. Shaw asked that the case should be allowed to go on with regard to one of the houses mentioned in the summons. The defendant, he said, had sent a cheque for part of the account, but had deducted a sum of 9s.—25 per cent. of the whole amount—in respect of each house, for what he called "empties." The point on which the Board wanted the decision of the Magistrate was whether, in the circumstances, the defendant was entitled to the deduction he claimed. The question was one of general importance; and the decision would affect many other houses. Mr. Paul Taylor held that the summons was bad. Mr. Kebbell informed the Magistrate that there was nothing to prevent the Board prosecuting their claim in the County Court, notwithstanding the lapse of over six months. His Worship thereupon dismissed the summons, with £3 3s. costs.

At the North London Police Court, Mr. J. B. Kyffin, of Dulwich Common, was summoned by the Metropolitan Water Board for unlawfully connecting the service-pipe of No. 40, Dunstan Street, Kingsland, with the water-fittings of No. 42, and also for permitting the tenant of No. 42 to take water from the adjoining house without the consent of the Board. Mr. Collins appeared for the Board; Mr. S. A. Kyffin represented the defendant, who is the owner of a large number of houses in the district. The essential facts were not disputed. The Board had cut off the supply of No. 42 because of a leak, and when the owner relet the house, he directed that the connection should be made with No. 40. The Board objected to give a supply again unless a cistern was provided. Counsel for the defendant contended that, under bye-laws and regulations made in 1871, Mr. Kyffin, being the owner of the block of houses, had the right to connect two or more of them. Mr. Collins said the whole point was the consent of the Board; and this had not been obtained. If consent had been given, the connection might have been legally made. He also argued that the houses were not a "block or group," as specified by the regulations. Mr. Fordham said he was of opinion that section 19 of the Water-Works Clauses Act of 1863 had been contravened, as consent had not been obtained; and he imposed a penalty of 40s., with £2 2s. costs. He agreed to state a case for the opinion of the High Court.

The Charge against Kent County Gas Company Promoters.

At the Mansion House last Tuesday, before Alderman Sir James Ritchie, proceedings were resumed on the summonses taken out against Henry Warwick Gyde (otherwise Peter Henry Bernard), on bail, and Walter Darby—both of whom, as may be remembered, were concerned in the promotion of the Kent County Gas Company—by Mr. E. V. Fox, the Examiner in the Companies Winding-Up Department of the Board of Trade, for conspiring together and with Septimus Marcus (otherwise Marcus Edward Septimus Bernard) to obtain by false pretences moneys and securities from such persons as should be induced to become debenture-holders in the North Wales Slate Quarries, Limited, and in the Welsh Slate Quarries, Limited. The summonses were heard first on the 14th ult. (see *ante*, p. 174), when the defendant Darby did not appear; and he was not in attendance last Tuesday. Mr. Graham-Campbell and Mr. A. S. Carr were Counsel for the Crown; Mr. George Elliott appeared for the defendant Gyde; and Mr. H. H. Richards, solicitor, watched the case for parties interested. In the course of his statement, Mr. Graham-Campbell said that of the money paid for £4510 of worthless debentures in the North Wales Slate Quarries, Limited, the two defendants would be shown to have received nearly £4000, of which £1590 had been advanced by them to the Company. Of the £14,060 worthless debentures bought by the public in the Welsh Slate Quarries, Limited, the defendants netted about £8950. It was in these circumstances that the prosecution had been instituted; and at the close of the case he should ask that the defendant Gyde and also the defendant Darby (if by that time he had been arrested) should be committed for trial for conspiracy and fraud. Evidence in support of Counsel's statement having been given, Gyde was again admitted to bail.

MISCELLANEOUS NEWS.

MUNICIPAL AND PUBLIC HEALTH EXHIBITION.

At the Agricultural Hall, Islington, last Friday, the Municipal, Building, and Public Health Exhibition organized by Messrs. Smith and Bridges, who, it may be remembered, carried out the arrangements for the successful Gas Exhibition at Earl's Court in 1904, was opened by the Lord Mayor of Melbourne (Mr. Henry Weedon), in the presence of a numerous company. As already mentioned in the "JOURNAL," it is being held under the patronage of two Lords Lieutenant, and the Provosts, Mayors, and Chairmen of Municipal Councils of the leading cities throughout the world; and a strong Honorary Advisory Council has been formed to work in conjunction with the organizers. It is generally acknowledged that one of the most important questions of the present day is that which relates to the requirements of the public health; and the object of the exhibition is to bring before all who are engaged in the administration of municipal affairs some of the best methods of keeping their cities and towns healthy. In declaring the exhibition open, Mr. Weedon remarked that, though he had been in London only a week, he had been impressed with the size of the place and with the difficulties which the municipal authorities and their engineers, as well as the public health officials, have to face, as they have to deal with and undo much that is obsolete and antique, whereas in Australia the most modern improvements have been utilized to the utmost. He expressed his high appreciation of the compliment paid to him in the request that he should open the exhibition, and said he trusted it would assist in the education of municipal councillors, and be attended with success. At the close of the opening ceremony, the company partook of luncheon, under the presidency of Captain H. Riall Sankey, R.A., the Chairman of the Advisory Council. The toast of "Success to the Municipal, Building, and Public Health Exhibition," proposed by the Lord Mayor of Melbourne, having been cordially honoured, the Chairman proposed "Municipal Authorities and Institutions," and gave particulars of the exhibits contributed by different municipalities, the sending of which he regarded as evidence of the goodwill and fraternity of these bodies all the world over.

There are about 150 stands in the exhibition; but only a few of them call for any notice, so far as our readers are concerned. Messrs. Curtis and Harvey, Limited, make a brilliant show with their "Ironclad" incandescent gas-mantle. It differs from the ordinary mantle in having a metallic top, composed of an alloy which the firm have found to withstand the effects of heat, and which it is claimed imparts increased durability. They also show their "Iris" inverted mantles, which are made in both the ordinary and the bijou size. There are some artistic two and three light groups of lamps upon this stand. Two other brilliant stands are those of the De Laitte Gas-Machine Syndicate, Limited, and the Praed Patent Safety Gas-Light Company, Limited. In both cases, the illuminant is air gas, produced by petrol in compact plant easily controlled, and used in conjunction with mantles for lighting or in the ordinary way for cooking purposes. The De Laitte system is in use for lighting the Bishopston Station of the Caledonian Railway; and it is stated that there are upwards of 6000 of the machines at work. Either this or the Praed system would be suitable for lighting isolated mansions, institutions, or even small villages; and the gas in both cases is stated to be not only non-explosive and non-poisonous, but to cost only about 1s. 6d. per 1000 cubic feet. Automatic gas-lighting by the Gunning system is shown by the Automatic Light-Controlling Company, Limited; and the Elton-Stephens street-lamp lighter, by R. Stephens and Son, of Clevedon, Somerset. The former system is well known to our readers. In the latter, no liquid seal is employed in the lighter; and the makers state that "it may be thrown about in a workman's bag without getting out of order, fits ordinary gas-lamp fittings, and may be put in position by any workman of ordinary intelligence." These lighters have been in use at Clevedon since August, 1906, and, we learn, "with perfect success, and without altering the pressure at the gas-works." Reference to automatic lighting leads naturally to a notice of the stand of Messrs. Parkinson and W. & B. Cowan, Limited, where are shown square, hexagon, and circular lamps for public lighting, suitable for upright or inverted incandescent burners, lamp-columns, wrought-iron wall-brackets, &c. The "P. & C." ball ventilator for exposed positions, the conversion set, for changing the flat-flame to the incandescent system, and a collection of brasswork articles (including anti-vibrators) used in connection with public lighting, are comprised in the firm's exhibit.

From the use of gas for lighting we pass to its employment for culinary purposes; and probably the single exhibit of the Richmond Gas Stove and Meter Company, Limited, is sufficiently comprehensive to satisfy the requirements of all the municipal councillors, their officers, and the other people who are likely to visit the exhibition. It is an excellent display; conspicuous features of it being a special large cooking appliance suitable for municipal buildings, hospitals, hotels, &c., and a large carving-table, boiling-table, stockpot and stand, and pastry-ovens. The firm also show their "Crusader" and "Model" cookers, "A. B. C." gas-fires, in ordinary black enamel and in "Porcellanite" coloured finish, flueless gas-steam, condensing, and white-light radiators, and the usual classes of copper goods. A combination gas and coal range, which is stated to cook equally well with gas or coal, is shown by the Standard Range and Foundry Company, Limited, of Watford. Before leaving the gas exhibits, attention may be directed to the stand of Messrs. John Ruscoe and Co., Limited, on which may be seen various machines for taking off branch connections from both gas and water mains under pressure, a case containing the tools employed in repairing fractured pipes, leaky sockets, &c., and some strands of lead wool.

Passing from the repair of pipes to the restoration and treatment of road surfaces, the Phœnix Engineering Company, Limited, of Chard, show a machine for testing earthenware pipes with water pressure, a small pitch and tar boiler on wheels, a hand-lift trench and contractor's pump on a small tank, and lift and force pumps arranged for sinking wells. In view of the interest attaching to the subject of the tarring of roads, attention should be called to the tar-macadam mixer shown by Mr. Arthur Koppel, of Clement's Lane, E.C., which is in use in a number of places. The size on view is complete with tar-tank, and has a capacity of 80 yards per day. Another subject which has of late been under the notice of gas and water engineers is that of armoured concrete construction. Photographs and models of framework made on the Coignet system are shown by the Armoured Concrete Constructions Company, of Victoria Street, Westminster. The general principle governing this system is to allow round bars to support the tensile strains, while the concrete bears the compression. In the case of pipes, however, the framework alone bears the efforts of extension; the concrete being considered as only a suitable filling to contain the liquid.

As mentioned in the preliminary notices of the exhibition which have appeared in our columns, arrangements have been made for holding conferences upon subjects connected with municipal management and the public health. They commence each day at three o'clock; and the first was fixed for yesterday, when Dr. Samuel Rideal was to deal with "The Bacterial Analysis of Drinking Water," and Mr. W. H. Booth with "Small Water Supplies." To-day, Mr. W. Noble Twelvetrees will discourse on "Reinforced Concrete in Municipal Engineering," and Mr. J. G. O'Sullivan on "Some Aspects of Water-Works." To-morrow, Mr. Leon Gaster will take up the subject of "Efficient Illumination and Municipal Requirements," and give demonstrations. The other papers promised are as follows: May 7—"On the Lightning Manipulator," by Mr. A. Harrison, the Borough Engineer of Southwark; "Coalesine from Refuse," by Mr. H. G. Coales; and "The Bacteriological and Microscopical Examination of Water," by Mr. W. J. Dibdin, F.I.C., F.C.S. May 8—"The Road Question," by Mr. H. T. Wakelam; "Road Construction and Treatment," by Professor Hele-Shaw; and "Town Paving," by Mr. W. L. Green. May 11—"Measurement of Light and Illumination," by Mr. H. Dow (with demonstrations). May 12—"Petrol and its Uses," by Captain Willoughby Wallace.

The exhibition, which is open from 10 a.m. till 10 p.m., will close next Tuesday.

NEW GAS-WORKS AT SOUTH BRENT.

A great boon is being conferred upon a number of the smaller towns in Devonshire by the operations of the Devon Gas Association, who, on Saturday last, formally inaugurated the fourth gas-works they have established in the county. This is at South Brent, a small town on the southern slopes of Dartmoor, much resorted to in the summer months by visitors from Plymouth and other places, who appreciate its bracing atmosphere and fine scenery. A drawback to the place hitherto has been the want of a system of public lighting, as well as the convenience of some method of private lighting more efficient and up-to-date than that of oil and candles. The works just inaugurated will supply both needs, and will no doubt add greatly to the prosperity of the town.

Though on a limited scale, the works are compact, and combine everything which the most modern practice suggests as suitable for undertakings of this class. Mr. Percy S. Hoyte, Engineer and Manager of the Plymouth Gas-Works, has acted as Consulting Engineer; the Contractors for the plant being Messrs. Willey and Co., of Exeter, and for the buildings Messrs. Veale and Son, of South Brent. The site is a convenient one, adjoining the Plymouth main road and near the River Avon. In the erection of the works use has been made of bricks manufactured at the Plymouth Gas-Works, relieved with white bricks; and though plain, the buildings have a neat and pleasing appearance. In the combined retort-house and coal-stores there are two settings of ⌂ retorts, 21 in. by 20 in., one of which is fired direct and the other on the generator system. The works are at present capable of turning out 5 to 6 million cubic feet of gas per annum, and ample space is provided for duplicating the plant when required. Adjoining the retort-house are the condensers and a tower scrubber. Two luteless purifiers, 6 feet square, worked by Pickering valves, are erected in the purifier-house; and there is a station meter of ample size, and a Simpson patent governor. The holder is 35 feet in diameter and 12 feet deep. It has a capacity of 12,000 cubic feet, and is fitted in a steel tank. All the pipes in the works are of 6 inches diameter. The mains to the town are 5 inch Mannesmann steel tubes; and all the distributing mains are of this kind—South Brent being, it is said, the only town except Chagford (also in Devon) in which steel mains are exclusively employed. The jointing has been done by lead wool. In joining the services to the Mannesmann steel tubes, use has been made of Woodall and Parkinson's patent expansion steel nipple. This is screwed into the main in the ordinary way, but has a slight projection, which is driven or pulled by a mandril from the inside of the nipple to the outside; thus further securing the nipple after it has been screwed into position. This has given most satisfactory results under very heavy pressures, and has proved valuable for all purposes.

At the invitation of the Directors of the Devon Gas Association and the Contractors, a large company assembled at the works on Saturday for the inauguration ceremony. They were welcomed by Mr. F. Templer Dupree, the Chairman of the Association and of Messrs. Willey and Co., and several of his co-Directors, including Messrs. S. Simpson, T. Glanfield, H. J. Westlake, and R. J. Rew, with Mr. G. Lane, Secretary. A lucid description of the plant was given by Mr. Rew; and the operation of gas making was illustrated in the firing and discharging of the retorts under the supervision of Mr. R. W. Oliver, the Manager of the works.

Subsequently the party had luncheon together—Mr. Dupree presiding. Mr. J. R. T. Kingwell, proposing "Success to the Devon Gas Association," said that South Brent was much indebted to the Association for coming there and establishing the works which they had seen. It was a decided step forward for the town to be lighted with gas. He had no doubt that the new undertaking would be successful, and that the town would be more prosperous because of it. The Chairman, in reply, said he believed it was a step in the right direction for South Brent to be up to date in the matter of lighting, and he hoped other places in the neighbourhood would follow its

example. The gas-works were as complete as any in the kingdom, and possessed the most modern plant and everything that could contribute to their success. A considerable amount of business was already assured them; and he had no doubt that other people would quickly avail themselves of the opportunity of using gas, now that they had it. Some of the consumers were already having cookers put in. In conclusion, he spoke of the services rendered in connection with the establishing of the works by Mr. T. Gibbons, of Plymouth, and Mr. R. H. Gill, of South Brent. Mr. Glanfield, who proposed the toast of "Prosperity to South Brent," said he was convinced that good lighting would add greatly to the success of the place. Mr. Simpson, Mr. Rew, and Mr. J. T. Foster, Manager of the Exmouth Gas-Works, were among the subsequent speakers.

GAS COAL PRICES.

Speaking at the meeting of the Primitiva Gas Company last Tuesday, Mr. H. E. Jones stated that certain English Companies with which he is connected have made their new coal contracts at 1s. 6d. to 2s. per ton below the figures paid last year.

One large company, we are aware, have made the bulk of their contracts at 10s. 6d. per ton, and have declined to entertain any offers above this figure—in fact, they are looking to obtaining a further reduction on the remainder of their requirements.

The "Yorkshire Post" says: "The Gaslight and Coke Company, London, are stated to have closed contracts for their annual supplies, amounting to 1,500,000 tons. The bulk of this quantity is to be drawn from the Durham district; and the c.i.f. prices range from 13s. to 14s., which allows 9s. 9d. to 10s. for the poorer qualities, 10s. 3d. to 10s. 6d. for best sorts, and 11s. for special brands."

In a statement pointing out that the bulk of London orders go this year to Durham, the "Financial Times" remarks: "After considerable negotiation, a move has at last been made in the matter of the placing of the important gas coal contracts for the current season. Although some of the smaller provincial corporation contracts have already been made, there has yet been no general arrangement entered into with the collieries; for provincial consumers are usually content to wait until a lead in the matter of price is given to them by the large London Companies, who, by reason of the huge quantity they take, and the selection of coalfield their varied means of transport offers to them, have bargaining powers which are denied to their weaker brethren. The Gaslight and Coke Company, for instance, carbonize each year nearly 1,500,000 tons; and South Yorkshire and North Derbyshire and North Notts collieries were last year successful in obtaining more than 50 per cent. of this amount. This year, however, the orders are mostly going back again to Durham; more than 1,000,000 tons having already been contracted for in that district. The bulk of the South Metropolitan contracts has yet to be placed; and with the Yorkshire and Derbyshire collieries having lost a large proportion of their last year's business, these pits may be expected to make a serious effort to balance matters by the terms they offer to this Company. A good deal has been said for the past month or so on the question of combination among gas coal producers; but it has always been found that when any great tonnage is lost by a particular colliery or district, systematic undercutting will be indulged in to secure an equal tonnage, thus bringing to an end any effort at combination, however well it may have been devised. So far as prices are going this year, the rates current twelve months ago are being fairly well maintained; and when advantage is being obtained by the consumer, it is because of the amount of slack taken along with the coals. The competition to secure the remainder of the London business should, however, make things easier for gas-works in the Midlands; and it would not be surprising to find a reduction of fully 1s. per ton accepted in some cases."

The "Iron and Coal Trades Review" says: "The London Gaslight and Coke Company have now practically completed their contracts for the ensuing twelve months' supply of gas coals. The bulk of their requirements, it is stated, has been placed with Durham coalowners; only comparatively small portions going to Yorkshire and Lancashire. Of the allotments made to Durham collieries, 550,000 tons have been allocated to the Wearside collieries for special qualities at c.i.f. prices, estimated to leave about 11s. a ton f.o.b.; while 250,000 tons are credited to Boldon coal at about 10s. 4½d., making 800,000 tons—the balance being distributed among the North Durham collieries for Tyne shipment at prices ranging from 10s. to 10s. 6d. f.o.b."

On the same subject, the "Sheffield Independent" publishes the following information from Newcastle: "The South Metropolitan Gas Company are still negotiating for their annual quantities, and are understood to have bought small lots at from 10s. to 10s. 6d., according to quality. But the bulk of their contracts are yet to close. Some 60,000 tons of gas coals have been sold for Italy at 11s. 3d. f.o.b., and a quantity of best norths unscreened at 11s.—both for shipment from now to the end of the year."

In the course of a leading article on "The Future of Gas Coal Prices," the "Iron and Coal Trades Review" last Friday said: "It is now becoming apparent that the collieries are emerging victoriously from the struggle which has been in progress lately between buyers and sellers as to the prices at which gas coal contracts should be made this year. Tremendous efforts have been put forth to 'bear' the market; but the ridiculously low figures offered in the course of the negotiations have been steadily rejected, with the result that one of the London Gas Companies has had to pay 11s. per ton f.o.b. for best Durhams, and foreign contracts have been concluded at from 3d. to 6d. per ton more in some cases. It is evident that buyers have decided to abandon the waiting policy which they were pursuing earlier in the year, in the belief that the market would turn in their favour; and they are now anxious to come to terms, having recognized that the reverse is likely to happen. It is a case of he who hesitates losing money. Consequently, the position of the gas coal collieries continues to be very strong. Already they are heavily sold ahead, and supplies of best qualities are very scarce. The owners of the Durham gas coal collieries are much to be envied, as there can be no doubt that their coal is pre-eminent for the manufacture of gas. The quantity is limited, and the output cannot be materially increased; while the substitution of other descriptions has been tried and has not proved satisfactory. Indeed, some of the varieties bought by consumers last year in lieu of Durham coal gave very different results from those fondly hoped for. Under these circumstances, the reports that some gas coal collieries are declining to quote for next year are not surprising. There seems every reason to believe that prices will move upwards rather than downwards in the near future. Indeed, it is a fact that, far from becoming weaker, the gas coal market has shown a substantial access of strength of late; and it is undeniable that prices have improved appreciably the last few weeks. It is remarkable what unanimity exists in well-informed quarters regarding the probable course of the gas coal market. With the great expansion of trade that has taken place in Europe generally during the past three or four years, the wealth of the people has materially increased, and with it the consumption of gas and all other commodities. The Continent is following England in the adoption of the slot meter, which has proved such a boon to the poor people of England. In this and other countries gas, notwithstanding the competition of electricity, is becoming more popular, both as an illuminant and as a fuel. Gas-fires and gas cooking-stoves are being put upon the market in increasing numbers; and there can be little doubt that, whether they are healthy or unhealthy to use, they find favour in the eyes of the people. As a result, the calls upon this country for gas coal are rapidly expanding, and must continue to expand in volume month by month. It is evident, therefore, that the value of the commodity must increase as the demand overtakes the available supply. It is significant in this connection to note that last year we exported a total of 10,445,091 tons of gas coal, compared with only 8,390,377 tons in 1906. It is also worthy of remark that in the first quarter of 1908, while our foreign shipments of steam coal underwent a positive decrease as compared with those of the corresponding period of last year, and the increase in some other qualities was not very large, gas coal exports showed an expansion amounting to over 380,000 tons. This advance bids fair to continue in an increasing ratio. We have the undoubted fact to-day that gas coal collieries are paying demurrage, such is the demand for that fuel; and there is the absolute certainty of this continuing for many weeks. It is true that in some quarters collieries have been accused of endeavouring to prop up prices artificially, and it has been contended that such an attempt must fail. With this contention we quite agree; and the fact that the market continues to exhibit so much strength is in itself a refutation of the charge. There can be no doubt that the present level of prices has a very solid basis in a genuinely active demand both at home and abroad."

BLACKPOOL CORPORATION GAS DEPARTMENT.

Annual Report to the Gas Committee.

In his report to the Blackpool Gas Committee on the past twelve months' operations, the Engineer and Manager (Mr. John Chew) says the year commenced with a big advance in the price of coal—in their case, making an addition of £5400. There has again been an increased demand for gas for all purposes; the output now being 531 million cubic feet (or 18 millions more than in the previous year), yielding about £64,000. There was last year an addition of 400 consumers, making a total of 13,623. This continual annual increase is now encroaching on the safe available reserve plant, so that some portions will shortly need supplementing. The bye-products market, in some lines, has been better; and larger quantities have been made and marketed at increased values—27,000 tons of coke, 639 tons of sulphate of ammonia, besides tar, sulphur, and other sundries, realizing £26,000. The general result of the year's working is an income of £90,000, and a gross profit of £27,000. After paying interest and sinking fund, there remains a net profit of £15,700. This sum, added to £242,000 already realized since the acquisition of the concern, makes a total of £257,700 profit that the works have yielded to the town. The capital cost has been slightly increased during the year (by £150), and now amounts to £210,700, towards the repayment of which there is in hand £60,000, besides a reserve fund of £9000.

Suffocated by a Geyser Gas-Jet.—At an inquest held at Wandsworth last Tuesday, it was stated that Mr. M. G. Palmer, a brewer, of Disraeli Street, Putney, had been suffocated by an escape of gas from a geyser jet while taking a bath. Dr. Freyberger expressed the opinion that the deceased, finding the room becoming stuffy, opened the door and the window, thus setting up a draught which extinguished the light. He probably did not detect the escape of gas, and gradually became unconscious.

Price of Gas at Hull.—At a meeting of the Hull Corporation Parliamentary Committee last week, Alderman Rollit, who presided, remarked that now the Corporation Bill to acquire the East Hull Gas Company's undertaking had been defeated, the Company had increased the price of gas by 3d. per 1000 cubic feet. He wondered they had not had the courage to go for 6d. Alderman E. Robson, J.P. (a Director of the Company), replied that they would have got it just as well. They had, he added, increased the price of gas to meet the expenditure of £2262 which they were put to in opposing the Corporation Bill.

Huddersfield Corporation Gas Department.—The receipts of the Huddersfield gas undertaking for the twelve months to March 31 last were £99,229, as against £99,478 in the previous year. The expenditure amounted to £78,833, compared with £71,561. For interest and sinking fund £13,744 has been set apart, making the total expenditure £92,578. A sum of £2911 has been placed to the depreciation account; and the amount transferred to the borough rate—equal to 2d. in the pound—is £3740, against £3686 in the previous year. The depreciation and contingencies account shows a total of £35,067. The number of prepayment meters fixed at March 31 was 14,717. There were at that date 27,614 consumers, compared with 26,515 in the preceding year.

MANAGEMENT OF THE NUNEATON GAS COMPANY.

In pursuance of a requisition made by certain shareholders of the Nuneaton Gas Company a few weeks ago (see *ante*, p. 111), an extraordinary general meeting was held on Monday last week, under the presidency of Mr. P. ILIFFE, the Chairman, to consider, and, if approved, to pass, the following resolution: "That this meeting of shareholders appoint a Committee who shall have full powers to investigate the affairs and accounts of the Company, and for that purpose to inspect the works and books, and employ experts for all purposes necessary, to inquire into the reason of the reduction in the dividend and the increase in the price of gas to the consumers, to inquire into the nature of the agreement between the Directors and the Manager (Mr. George Helps), which apparently permits him to devote a large portion of his time to outside work, some of which is to the detriment of gas companies; and to report the result of their investigations to a further meeting of shareholders." For the following account of the proceedings we are indebted to the "Nuneaton Record."

The SECRETARY (Mr. F. S. Clay) having read the notice convening the meeting,

The CHAIRMAN, without any remarks, called upon some shareholder to move the resolution.

After a pause,

Mr. NORTH said it was the opinion of a number of the shareholders that the affairs of the Company were going from bad to worse. The dividend had dropped by 2½ per cent., which represented a loss of capital value on the market of thousands of pounds, and there was the rise in the price of gas, which was already too high for a town of the size of Nuneaton. Why should these last resorts of a gas company be adopted? The answer was simple: Because the working account did not show a satisfactory profit to maintain the *status quo*. Why was the balance so small? Explanations had been asked for at successive Board meetings, but only lame replies had been received, though he had to acknowledge the courtesy of Mr. Swinnerton (one of the Directors), at the last shareholders' meeting, in giving the only replies that were of any service. He ventured to suggest, though the means of ascertaining the exact facts were not at his disposal, that the practical working of the concern was not good—that the results were not commensurate with the elaborate and costly plant at the disposal of the management. The number of cubic feet of gas made per ton of coal was only 10,500; whereas in other places the quantity was commonly from 11,000 to 12,000 cubic feet. The leakage last year was 14 per cent.; and in the previous year, 20 per cent. Why this should be he did not know, as the average leakage for a town like Nuneaton was 5 or 6 per cent., and there were many places where it was much less. How could a concern conducted on these lines, and with a very expensive staff, expect to earn large profits? At Hinckley they earned £5415 on the year, compared with £3563 at Nuneaton. He could multiply instances of this kind; but this was one next door. Hinckley was a rather small concern, and had a 3d. railway rate more than Nuneaton, and the price of coal was about the same; but in the one case they had constant practical supervision, always in touch with the works and the consumers, whereas in the other they had intermittent supervision, fitted in, apparently, to fill up the spare time of the Engineer, who did not even reside within the compass of their gas supply. No doubt this was within the four corners of his agreement, and therefore the blame must be with the Directors who entered into it, and not with the Engineer, who must look after his own interests. Innuendos as to the motive of those who signed the requisition for the meeting had been freely circulated (inspired, so far as he could see). But he had always criticized from a business point of view, as a shareholder; and it was his opinion, and that of many others, that the affairs of the Company had not been managed as they should be. The balance-sheet was about the most hopeless there could be; and there was not a single "stiver" in the reserve. Then there was that ghastly £2500 of debentures in the Ecliptic Fittings Company. They were informed at the last meeting that there was no freehold at the works; and that therefore the Gas Company's security was simply in the stock, in case the Ecliptic Company failed. This arrangement was, in his judgment, illegally entered into; and, in any case, it was done without consulting the shareholders. If the business was good and sound, why part with it? How was the valuation of the business arrived at? Was an impartial person employed? He thought they ought to have a separate balance-sheet giving particulars of this speculation from start to finish. It seemed to him that those in power did not like criticism; but he hoped that the Board would afford the fullest opportunities for investigation.

Mr. J. DRAKE seconded the motion. He said the requisition was signed by several of the shareholders in consequence of the reduction in the dividend. At the ordinary meeting last year, the Chairman informed him that it was caused by the increase in the price of coal; but he had inquired of the Manager of one of the largest collieries in the district, and was told that this was not sufficient to account for it. It was stated at the ordinary meeting that their Manager did not put in one day a week at the gas-works. This was not denied; so he could only come to the conclusion that there was some truth in it. He had discovered that in one year the Manager had devoted 50 days in London to one case, giving evidence to prevent a gas company obtaining a reduction in their rating. The Nuneaton Gas Company might some day have to apply in a similar case, and on what ground could their Manager act in support of them getting the reduction when he had taken an opposite stand in the present instance? Mr. Helps had devoted a good deal of time to the Ecliptic Fittings Company, and to travelling about the country; and he (Mr. Drake) considered that these things had more to do with the reduction in the dividend than any increase in the price of coal. Further, the Manager, not having the time to do the work himself, had to engage an Assistant-Manager, which was not justified by the size of the works, and which meant a waste of money, inasmuch as the shareholders had had to pay two to do the work of one. Those who signed the requisition feared they did not know the worst; hence their desire for a full investigation. It was quite evident that the Directors had lost control of the Manager, and that he controlled the Directors to the detriment of the shareholders. The present Directors had had control of the works for something like twenty years, and, though there had been an enormous increase in the consumption of gas during this period, the finances were in a deplorable state. They had an overdraft at the bank, dissatisfaction among the employees, an absence of management of the works, and complaints about the quality of the gas, which was driving people to take on electricity. These things were more likely to be the causes of the reduced dividend than the increase in the cost of coal.

Mr. NORTH asked to be allowed to add a few remarks.

Objection being raised to this, the shareholders were asked to express their opinion on the matter; and they decided against the objection.

Mr. NORTH then proceeded to criticize the action of the Directors with respect to the issue of new capital, and called attention to the small number of shares taken by members of the Board as compared with himself, his father, and others, who, he said, had bought shares because they thought the Company was sound, and without any idea of making abnormal profit. He thought the action of the Board in this matter was not particularly loyal towards the Company in helping them to raise additional capital.

Mr. SWINNERTON, speaking on behalf of the Directors, proceeded to deal with some of the points raised. He regretted to hear that the replies given to questions at the annual meeting had not been considered satisfactory. Mr. North had been good enough to say that those he (Mr. Swinnerton) gave were, so far as they went, what he required; and he (the speaker) did not quite understand what it was the Directors did not answer fully. He regretted that, instead of calling an extraordinary meeting, the requisitionists had not waited for another month or so until the annual meeting, and brought forward their criticisms on that occasion. It had been said that the balance-sheet last year was "most hopeless;" but, personally, he did not look upon it in that light. They had been asked with regard to the agreement with Mr. Helps. This agreement was actually signed on Dec. 10, 1906, and it carried out an agreement which was verbally entered into some two years previously. The particular clause to which they would probably wish him to refer was that relating to outside work; and it ran thus: "The said George Helps, with the consent of the Directors, shall be at liberty to act as a consulting engineer for his own profit, provided that the interests of the Company or the management of their said works and undertaking shall not, in the opinion of the Directors, be in any way prejudicially affected thereby." This agreement was for a total period of eleven years, but was terminable on either side giving a six months' notice at the end of the first five years—*i.e.*, three years from Dec. 10 next. In the arrangements for the transfer to the Ecliptic Fittings Company, a clause was inserted allowing the Manager of the Gas Company to exercise control over that business. It had been stated that it was said at the annual meeting that the Manager only put in one day a week at the gas-works, and that this statement was not contradicted. If this was so, it was because he did not hear it; for it was both false and absurd. With regard to the work undertaken by Mr. Helps over the South Metropolitan rating case, this was done with the sanction of the Directors, and it necessitated Mr. Helps putting in a great amount of night work in connection with the Nuneaton Company. The Directors had no reason to believe that the result of this action would be in any way prejudicial to the Company; in fact, the knowledge gained by Mr. Helps from the valuation as to the proper assessment of gas-works had been to the advantage rather than to the disadvantage of the Company. With respect to the fittings department, the position was this: In order to compete with improved methods of lighting, they for some time went on with certain works with regard to Mr. Helps's patent fittings, which they were perfectly justified in doing under their Act of Parliament. The business increased to a greater extent than they had anticipated when they started, and they found that, in order to properly develop it and make it more of a success, they must incur a further expenditure of from £1000 to £1500. They carefully considered whether or not they should go in for this; and, bearing in mind the overdraft at the bank, and that it would necessitate the raising of fresh capital, the Directors came to the conclusion that it would not be advisable to put further money into it. Arrangements were then made by Mr. Helps for the floating of an entirely separate Company in order to take over the whole business; and it was definitely stipulated that the Gas Company should have made no loss by the fittings business as it had hitherto been conducted. It was necessary that the Gas Company should help the Fittings Company to the extent of £2500 of debentures at 6 per cent.; and these were made the first charge on everything possessed by the Fittings Company—stock, book debts, &c. The terms were that that Company should pay back £250 every half year, with interest. Two of these payments had already been made; and there was no reason to suppose that the future payments would not be met. So that no loss had occurred or would occur to the Gas Company. It was to their interest to encourage the Fittings Company, for they benefited by all improvements in the consumption of gas for lighting purposes, in the greater number of persons who adopted it. Proceeding to deal with the various reasons that led to the installation of the water-gas plant, Mr. Swinnerton said that, if the same circumstances and opportunity recurred, the Directors would act in precisely the same way. As to the reduction of the dividend, though this had occurred, the record of the Company was not a very bad one. They took over the works in 1886, and the capital was then £1000 per million cubic feet of gas made; by 1892 it had gone down to £820; and by 1897 to £734. In 1902 it was £742; and in 1907, £685. With regard to the dividend paid, in 1888-9 it was 6 per cent.; thence to 1896 it was 7⅛ per cent.; to 1899, 8¾ per cent. In 1900 it was 7½ per cent.; to 1906, 10 per cent.; and in 1907, 7½ per cent. Thus, the original shareholders of the Company did not appear to have very much of which to complain. He quite understood that those who purchased shares at the enhanced price were disappointed at the reduction in dividend which had been made; but this was only in accord with the experiences that people had at times in connection with all trading companies. They could not always expect to have the maximum dividend. One thing he wanted to say was that the difficulties of working the concern during the past two years had been serious, owing to the competition they had had from the electric light undertaking, which had rendered it necessary for them to widen their area of supply and increase their mileage of mains. All these difficulties had made the work of the Directors far from pleasant; and

he should be only too thankful to retire altogether. After trying as the Directors had done to overcome these difficulties, they felt that their anxieties had been most materially increased by the action of certain shareholders, which, if continued, would make it impossible to properly carry on the business of the Company. There was not a man who would take on the direction of a company and put up with this sort of thing. There always would be dissatisfied workpeople so long as there were shareholders who listened to all the men had to say; and the Directors had been told by men in their own office that if they did not do a certain thing the men would go and tell somebody. How were the Directors to work under these circumstances? The shareholders must either turn out the whole of the Directors and start afresh, or have confidence in them, and realize that they would work as fairly as possible with their employees. But as soon as they began to tamper with workpeople under a company, they might as well throw up all discipline and go to the dogs.

Mr. MELLY asked, for the satisfaction of the querist, how it came about that an Assistant-Manager was appointed.

Mr. HELPS said that when he came to the works ten years ago, they had a foreman who resided in one of the Company's houses, and when he left it was decided to appoint an Assistant-Manager in his stead. They had had him for the last nine years.

Some further questions having been put, Mr. HELPS replied to the various criticisms. He said he supposed a good many of those present knew something of Mr. North, who, as a gas engineer, was capable of criticizing the Company's balance-sheet. But as doctors disagreed, so did engineers; and he (Mr. Helps) disagreed with Mr. North, who, while he had dealt with many points, had not done so definitely. He (Mr. Helps) would reply to any definite question within five minutes of it being made; but generalizations were absurd. Mr. North had spoken of leakage, and had said that at Nuneaton it amounted to 14 per cent.; whereas last year it was 10·35 per cent. Mr. North compared this with other places which had 5 per cent.; but it must be understood that leakage depended on the mileage of mains. Looked at in this light, the Nuneaton Company's leakage per mile was 300,000 cubic feet; but if double the quantity of gas was used, this would be proportionately reduced. It was an utter absurdity to say that the Nuneaton leakage was high. It was extremely low, and would compare favourably with any town in the kingdom. Mr. North had spoken of Leamington getting 11,000 cubic feet of gas to the ton, against Nuneaton's 10,500 cubic feet. But such criticisms were most unfair, as Mr. North did not tell them what coal was used at Leamington. Coal could be bought that would give only 8000 cubic feet per ton, or they could purchase coal of a quality that would give 12,000 cubic feet per ton. But they would not get one coal at the same price as the other. The cost of the coal at Leamington was more than it was at Nuneaton. Regarding the criticism of the balance-sheet, he would say that the profits made for the past ten years averaged £3478; whereas the profits for the six previous years only averaged £2035. In the ten years, the make of gas had increased by 33 millions, and the consumers by 1145; while 11 miles of new mains had been laid. As to the price of gas, this was fixed by the capital charges, rates, cost of labour, &c., the quantity of gas they could sell per consumer, and the sale per mile of main. It was clear that when they laid mains to the outskirts, they could not expect a commensurate sale immediately they had done so, and, as he had said, within the past few years they had laid 11 miles of mains, 9 miles of which were high-pressure mains. For 9 miles of the mains they sold less than 9 million cubic feet of gas at present. What had to be considered in the selling price of gas was the amount the shareholders required for dividends. The less they required, the less would be the price at which the gas could be sold. Rugby had been mentioned as selling gas at 2s. 4d. per 1000 cubic feet, while the Nuneaton price was 3s. 6d. But the average price at Nuneaton was 3s. There was really 8d. per 1000 cubic feet difference between Nuneaton and Rugby; and it was simply in capital charges. He should say that the reason was that in the past the Rugby shareholders had not participated in the profits to the full. To explain: If the money paid by the Nuneaton Gas Company during the past ten years had not been used to pay the shareholders their dividends, and had been used to reduce the capital, this would have been lowered to £18,220, and the capital charges would have been only 4d. per 1000 cubic feet. Mr. North had said there was not a "stiver" in the reserve fund; but he (Mr. Helps) thought the profit and loss account represented the reserve fund. Proceeding to speak in his capacity of a shareholder, Mr. Helps said Mr. North had brought about this agitation with the express purpose of himself becoming a Director of the Company. Mr. North was the representative of a firm selling meters and cookers, and it was only when he failed to get orders from the Company that he came and criticized the balance-sheets. He (Mr. Helps) had told him that he was ready, at any time, to discuss matters with him, either through the Press or privately. It must not be lost sight of that the object of the meeting was to turn out the present Directors, and put the other gentlemen in; and they could not get away from the personal aspect of the case. (Cries of "Shame.") All the present Directors had served the Company well.

Mr. W. G. PHILLIPS said he had only been a Director for twelve months. He was one of those unfortunate ones who purchased his shares when the market was up, and he regretted the fall; but, after all, it was an ordinary business risk. He considered his co-Directors fully deserved the continued confidence of the shareholders, for he had seen nothing to which he could take exception. He thought they acted wisely in relation to the Ecliptic Fittings Company. He regretted that any personal matter had been introduced in respect to this meeting. He was afraid that between Mr. North and Mr. Helps there was a personal feeling, and they could not keep it down; and it was for this reason that the criticisms of Mr. North seemed to him to be highly coloured. The position of the Company could not be so good to-day as it was prior to the advent of the electric light. With regard to Leamington, they had had a large number of consumers who took gas more readily and extensively than was done in a neighbourhood such as Nuneaton. In Leamington, too, the supply of electricity was in the hands of a private company, and not of the Corporation. It had been mentioned that the development of gas-cookers had not increased so much as it had done in other towns; but an important factor was that this was a very large mining population, and that all the miners had their coal for nothing, so that it was not likely they would go in for gas-cookers. He deprecated any interference on the part of the shareholders between the workpeople and the management, and hoped they would have no more of it.

Mr. MELLY said he had been approached by some shareholders and asked to inquire into the affairs of the Company. He listened most carefully to a number of statements which apparently were all facts detrimental to the good management of the concern; and he now wished to say, in the very strongest way possible, that when he went to Mr. Swinnerton he found him willing to tell him anything he desired, and to fully explain every matter he brought before him. He then again met his friends, and told them that he was not prepared to sign the requisition for a special meeting, because he thought everything they required could be obtained at the annual meeting, for which he now thought they might just as well have waited.

The CHAIRMAN observed that at the annual meeting they had always invited criticism. He was sure the Directors had always done their best in the real interests of the shareholders.

Mr. NORTH made a few remarks to the effect that he had simply been acting as a shareholder, and had done so at the request of other shareholders.

The resolution was then put, with the result that 13 voted for and 20 against it; and it was accordingly declared lost.

The Press were subsequently informed that the proxy voting was 313 for and 1184 against the resolution; and that the total value of shares represented was £4856 for and £21,160 against it.

UNIVERSAL GAS METHANE AND "BUISSON HELLA" COMPANY, LIMITED.

Statutory Meeting.

The Statutory Meeting of the Company was held last Wednesday, at the Registered Offices, No. 70, Queen Victoria Street, E.C.—Mr. RANDALL H. PYE, the Chairman, presiding—to receive a report of the Directors and an abstract of receipts and payments of the Company on capital account, and a certificate of the Auditors thereon, &c.

The SECRETARY (Mr. Thomas Greenhill) read the notice convening the meeting, the Directors' report, and the Auditors' certificate. The report stated that 300,000 preference shares of £1 each and 600,000 ordinary shares of 10s. each had been issued. The 600,000 ordinary shares had been allotted as fully paid up in part payment for the purchase of the inventions for the manufacture of gas methane and incandescent mantles. The total amount of cash received by the Company in respect of shares issued wholly for cash was £299,453. The receipts and payments of the Company on capital account to the date of the report were: Receipts: 299,393 preference shares, £299,393; and 600 preference shares, £60—total, £299,453. Payments: Vendor, in part payment of purchase price of inventions, &c., £180,000; payment for use of factory, machines, &c., £20,000—total £200,000. The preliminary expenses were estimated at £2000.

The CHAIRMAN then proposed, and the MANAGING DIRECTOR (M. Louis Lecacheux) seconded, the adoption of the report; and this was unanimously agreed to.

The CHAIRMAN remarked that this was the statutory meeting of the Company, called in compliance with the law; and as a rule such meetings were purely formal. As, however, a great many incorrect statements in regard to the Company had been publicly made, the Directors thought the shareholders would expect to receive from them somewhat more detailed information than was usually given at a statutory meeting, and to be accorded the opportunity of satisfying themselves by questions on any points as to which they might be in doubt. The Company was incorporated on Jan. 17 last; and the certificate giving permission to trade was received on Feb. 7. On the value and success of the invention of the "Buisson Hella" (Laigle patent), and of the gas methane, it was perhaps hardly necessary to speak to some of the shareholders present, as they must have seen the former in use in Paris and have appreciated its superiority in the matter both of lighting and economy. The Company claimed that the "Buisson" had an advantage over other methods of lighting on account of its durability, superiority of lighting power, and utility for use with coal gas, petrol, alcohol spirit, and acetylene, either for fixed or portable lamps. The "Buisson" could be seen at the offices; and the lamps would shortly be on view at the Company's premises No. 54, Cheapside. The Company had received inquiries from all parts, both at home and abroad, asking them to quote prices for the "Buissons Hella;" these inquiries being made by individuals and corporations who doubtless had seen the "Buissons" in use in Paris, and satisfied themselves as to their utility. Owing to technical requirements, there had been some delay in starting the manufactory in England; the services of the Engineers, whose assistance was indispensable, and which was furnished by the French Company, having been urgently needed in France. But so as to enable the Company to deal with the orders in this country pending the starting of a manufactory of their own, they had been able to make a contract with the French Company for the supply of a large number of the "Buissons" at a price which should leave a considerable profit. Negotiations in regard to the acquisition of a suitable building for the factory were now in active progress. As regarded the patents, serious misrepresentations had been made—some even not scrupling to assert that applications had been refused. Such statements were entirely untrue and without foundation. For the gas methane, patents had been granted in about twenty countries; and for the "Buissons Hella" they had obtained patents for Germany, Belgium, Denmark, Spain, Portugal, Tunis, Luxembourg, and Finland, while applications were being made for patents for almost all other countries, and there appeared to be no doubt the others would follow in due course. Some of them had, in fact, been granted; but the papers were not yet to hand. It was unnecessary to enlarge upon the importance of the German patents, as everyone at all conversant

with patent law must be aware that these were never granted without the most careful investigation. Serious inquiries for the acquisition of sundry of these patents, on terms which would show large benefits to the Company, had been already received, and were now the subject of negotiation. These and other matters were receiving the most careful consideration of the Board; and he thought therefore the shareholders would agree with him that the existence of the Company was not only justified, but there was every prospect of a successful issue of its operations. As regarded finances the Directors had experienced some difficulty, owing to a considerable amount of the Company's money being at its credit with the Banco Franco-Espanol, which, as no doubt they were aware, had been the subject of proceedings in France. These difficulties were in course of being overcome; and the Directors did not now entertain any fear on that score.

M. BERTOUT remarked that the capital of the Company was £600,000, and of this £480,000 had been paid away for patents and £20,000 for the use of a factory, &c. This left £100,000; and he wished to know if this sum was locked up in the Banco Franco-Espanol.

The CHAIRMAN replied that it was not. The working capital was at the disposal of the Company.

Mr. JOHN STEPHENS said they had all been interested in the speech of the Chairman, and his statement had enlightened them very much indeed. He had examined casually the "Buisson" mantle in the office there; and he was not quite satisfied that the light was as good as with the ordinary incandescent mantle used in London. He asked how it compared (say) with the No. 2 Welsbach, because this was what they would be immediately faced with in London.

The CHAIRMAN: The burner here really should be compared with a "Bébé." You are comparing it with a large one.

Mr. STEPHENS: Have you a larger "Buisson Hella" to put on the market which will compare favourably with the ordinary incandescent light?

The MANAGING DIRECTOR (whose reply was interpreted) said that the consumption for the Welsbach No. 2 mantle was about 160 litres of gas, and for the small "Buisson Hella" about 90 litres. If they compared the Welsbach mantle of 90 litres with the "Buisson," they would see that the latter gave more light. There were larger "Buissons;" but in France almost everywhere they used the small mantles. When the Company's premises in Cheapside were opened, there would be an opportunity of comparing the Welsbach mantles with "Buissons Hella" consuming the same quantity of gas. The latter could be used in portable lamps, and with petrol or any other spirit.

The CHAIRMAN remarked that shaking did not break the "Buissons Hella." Ordinary mantles, when used for street lighting, deteriorated very quickly; but there was no deterioration with the "Buissons." He then announced the resignation, for purely personal reasons, of one of the Directors of the Company residing in France.

Messrs. Hart Bros., Tibbetts, Heiron, and Co. were appointed Auditors; and the proceedings terminated with a vote of thanks to the Chairman, who, in reply, said he thought everything was as satisfactory as they could expect.

PRIMITIVA GAS AND ELECTRIC LIGHTING COMPANY.

The Buenos Ayres Gas Companies and the Municipality—Cheaper Coal.

The Annual General Meeting of the Company was held last Tuesday, at the London Offices, 153, Leadenhall Street, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. J. H. Bouwer) read the notice calling the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, having paid a high tribute to the personal qualities and business capacity of the late Mr. Joseph Kincaid, who was a member of the Board, moved the adoption of the report and accounts, and the declaration of a final dividend of 4s. 6d. per share (free of income-tax), making 7 per cent. for the year. He said it was with no little satisfaction the Directors were able to put the results of the year's operations before the shareholders, more especially seeing that they were able to propose an undiminished dividend, in face of the fact that the cost of coal advanced very considerably last year, which caused many English gas companies to raise the price of gas—a step which it was not considered advisable to take in Buenos Ayres. In addition, it would be remembered that, in the previous year, there was a great disturbance of labour in the city, which, in some measure, attacked their neighbours, the other gas companies, there. This, however, had been recently alluded to in the very able speech of the Chairman of the River Plate Company (*ante*, p. 174). Although they had no strikes during the year in their own (the Primitiva Company's) service, they had had to advance the wages; and, in the preceding year, they had to resist some extraordinary demands, and had small strikes of which they soon disposed. Therefore, their wages bill was much more now than it was before. In view of these two facts, it would be agreed there was cause for congratulation in having a balance adequate to the payment of an undiminished dividend. They had realized a balance of £105,420, as against £113,396; and when he mentioned that the price of coal accounted for £5000 of this, it would be seen how simply the difference had arisen. The total credit to the profit and loss account was therefore, adding the £16,612 outstanding on the previous year, £122,032. Interest on debentures had absorbed £22,828; and interest, discount and commission, London expenses, &c., had taken £9101. Two dividends on the preference shares had amounted to £40,000; and an interim dividend of 2s. 6d. on the ordinary shares had taken £10,000. After meeting these sums, they placed to general reserve account £6221, which was only £8500 less than in the previous year. Out of the balance standing to the credit of profit and loss (£33,881), the Directors recommended the final dividend referred to in the resolution. It was with great satisfaction the Board were able to report a steadily increasing demand for cooking and heating stoves, as well as considerable extensions of the number of meters fixed and services laid. When he told the shareholders that but a year or two back there had not been a single heating or cooking stove issued by the Company, it would be seen how successful they had been in this direction, and this was but the beginning. They had had an increase of 40 per cent. in cooking-stoves. At the end of the year they had 3983 stoves fixed. They had placed out 1164 new ones; and at the corresponding date of the previous year, they had 2819. Having enlarged upon the economic importance of the day consumption of gas by cooking and heating stoves and other appliances, through keeping capital and plant employed to a greater extent than when used for lighting only, he said that, in the course of the year, they had added 12¼ miles of mains to the distribution system, which now totalled to nearly 240 miles. They had also put in 2247 new services, which raised the total to 46,990. Of ordinary meters, they had fixed 1201, which raised the number to 26,219. The working results which brought out their excellent financial balance were exceptionally good; and he could not speak too highly or flatteringly of the capability of their technical advisers at Buenos Ayres. The gas made per ton of coal carbonized reached 11,049 cubic feet; and the sale of gas, stimulated by the appliances to which he had been referring, had increased by 10½ per cent. This was a very unusual increase for the Company. For some years, they had what was considered a very moderate increase for a Company with a new territory like that they were dealing with. But the Company's Local Committee saw the propriety of establishing show-rooms to illustrate the uses of gas; and this and other work of the kind had assisted in producing the large increase in consumption. Their Managing-Director spoke most confidently of a good increase being maintained. Therefore, it would be seen there was a grand future for the Company. If with the same capital and appliances they could manufacture more gas, it must tend to make the gas cheaper for the consumer, and more profitable to the Company. But the note of the administration of the Company must be, in the first instance, not to look for immediate high dividends; these must be subservient to reducing the price of gas to the consumers. He had told them a good story of prosperity; but there was another matter to which he had to refer. The Municipality of Buenos Ayres some time ago entered into an arrangement with a large German Electric Lighting and Power Company, by which the former got a clause giving the latter a time concession, which was a very common practice on the Continent of Europe. They gave the Company authority to carry out their works, to break up the streets, and so forth, on the understanding that, at the end of fifty years, the whole of the plant was to be handed over to the Municipality; and they were to charge such a rate for electricity as would give them a profit and a sum beyond for amortization. Three Gas Companies, with more or less firm legal rights, had grown up on the spot, but without the exact confirmation that was given by an English Act of Parliament. Having whetted their appetites by providing for the swallowing up of the German Electricity Company, the Municipality began to attack the Gas Companies. In the first place, they threatened to exercise their powers (which the Companies to some extent disputed) of, at a particular date, fixing a less price for gas—a price that might have been so low that it would have been altogether unprofitable and useless to the Companies. This was used as a sort of threat, to show the Companies they could no longer go on with quite the freedom they had previously enjoyed—charging such a price as they might agree among themselves they would not compete below. It was then necessary to enter into negotiations to see what would pacify the Municipality. The Company were extremely fortunate in their local administration. The Chairman of the Local Committee was Mr. Hale Pearson—a man who was highly placed, and of great influence. Then they had Mr. Villaneuva, who was a prominent man in the Government administration; and Mr. Dutilloy, who was a Stock Exchange man, and of large experience in the affairs of the city. These three gentlemen told the English Board that the time had arrived when it would be wise to allow them to see what permanent arrangements could be made to avoid the constant threats of the Municipality to step in and fix the price of gas. The Board authorized them to see what could be done; and they reported that the Municipality were determined to bring the other lighting authorities into the same position as the German Electricity Company, and to insist that, whatever was granted, it must include a system under which a price should be charged for gas that would repay the capital by amortization in a period of fifty years. This would require an extra sum annually equal to about 1¼ per cent. on the capital—thus increasing the burden of the consumers from 7 per cent. to 8¼ per cent. If the consumers, however, were contented that this should be so, and the works become public property at their expense in this way, then there was little use for the Company to make much difficulty over it. A contract was therefore arranged following very much the lines of that of the German Electricity Company, subject to being submitted to the shareholders for confirmation. But when the contract was received, the Board found certain clauses that they could not possibly accept. They could not agree to the surrender of the reserve and other moneys of the Company, nor to any interference in the administration of the concern. The contract was therefore returned with a respectful reply declining to be bound by it. He was glad to say there appeared to be a more reasonable spirit prevailing now, in that the Municipality were considering the application of the Companies for time to discuss the matter of a more modified form of agreement, in the direction of guaranteeing and guarding the interests of the shareholders. The scheme was not ripe yet, and it would be injudicious to discuss it. He must therefore ask the shareholders to give the Board their confidence in this matter. The Directors had confidence in the Local Committee; and both they and the London Board would take the best possible steps in the interests of the Company.

Mr. W. W. PHIPPS seconded the motion.

The CHAIRMAN, replying to questions, said, in the case of English companies he was connected with, there had been an abatement made in the price of coal of between 1s. 6d. and 2s. per ton. Some companies had been lucky enough to get a decrease of 2s. A reduction on these lines would no doubt follow for their own Company. He (the Chairman) was naturally very interested in the Coal Mines (Eight Hours) Bill. He went, as Chairman of the Gas Companies' Protection Association, with a deputation on the subject to Mr. Gladstone; and he thought the right honourable gentleman's reply to them was rather a weak one. Any attempt to legislate for any class of adult labour was a mistake. Through promised pensions, through the poor law, and through the regulation of a man's power of production, he thought the Government

were demoralizing and undermining the fibre of the British working man. Regarding the question of amalgamation with the other two Buenos Ayres Companies, it was rather a delicate subject. Their own Board had always been well disposed to amalgamation, as they were conscious of the economies to be realized. "Sweet were the uses of adversity." It was quite possible under the pressure of the demands of the Municipality, they might find everybody more favourable to a consideration of the matter.

The retiring Director (Mr. Phipps) was re-elected to his seat at the Board; and Messrs. Touche and Co. were reappointed Auditors.

Votes of thanks were passed to the Chairman and Directors, to Mr. Hale Pearson and the Local Committee, and to the Secretary and the London and local staff. In Mr. Bernard F. Browne, said the Chairman, they had a most valuable Engineer.

CAPE TOWN AND DISTRICT GASLIGHT COMPANY.

Continued Trade Depression—Use of Colonial Coal.

The Ordinary General Meeting of the Company was held on Friday, at the London Offices, New Broad Street House, E.C.—Mr. J. E. Lilley in the chair.

The Secretary (Mr. H. Yuill) read the notice convening the meeting; and the Directors' report (which was noticed in the "Journal" for the 28th ult., p. 247) and the accounts were taken as read.

The Chairman said those shareholders who had attended the meetings for the past two or three years would be well aware of the depressed and even stagnant condition of business in Cape Town and neighbourhood. He was sorry that there had been no change for the better in this respect during the past twelve months. On the contrary, if there had been any change at all, it was rather for the worse. It had been a period of great anxiety to the Directors, and also of strenuous effort, in order that everything that was possible might be done to improve the earning power of the Company. In addition to the depression in trade, the Company had suffered from keen competition in more than one direction. The Municipality of Cape Town had competed closely with them by supplying electricity for certain purposes at a price which the Directors contended was below its actual cost. The Company had for many years lighted the streets of Woodstock; and when the old contract expired, the Municipality were compelled by law to advertise for fresh tenders. Among the tenderers were the adjoining Municipality of Cape Town; and they named a price which the Directors felt certain must show a loss to Cape Town ratepayers. Of course, the Woodstock Municipality were quite willing to accept such a contract; and the Company therefore lost the lighting of the public streets. Such lighting was not generally profitable, and it had never been profitable to their Company; so that they lost nothing in this respect. But the Board had always desired to render loyal service to the Municipalities of the places in which they carried on business, and they would have preferred to have kept the contract, could they have done so without making a loss. Naturally, they did not sit down quietly under these conditions. They were trying to see whether any method could be evolved by which they could conduct public lighting on more economical lines; but in Cape Town incandescent gas suffered under some serious disadvantages for this purpose. One drawback was the strong gales experienced; and another nuisance, which the gales intensified greatly, was the fine white dust that was blown up from the roads. If there was any opening in the lamps which would allow this dust to enter, trouble arose. Therefore they had had to have the lamps carefully constructed. Torches could not be used for lighting on account of this; but still there were other methods—among them the automatic system, which was being tried at the present time. Though the Company lost no profit by the taking away of the public lighting, they did do so if the consumers for power and lighting were drawn away from them. They supplied a considerable quantity of gas for power purposes; but the Municipality of Cape Town furnished electricity for such uses at very special rates, and they also let out electric motors on favourable hire-purchase terms. All this required serious consideration; and in order that the Company should not lose their consumers, they reduced the price of gas. By this means they hoped to retain most of their customers, though it necessitated a very large sacrifice of profit. Notwithstanding their difficulties, they had made and sold more gas in the past year; but as they had had to lower the price for all purposes, they had received less money for it. There was, however, no use in keeping up the price and allowing the consumers to be drawn away. In addition to the lowering of the charges, great efforts had been made to secure additional consumers; and the Board thought that the result—which had been to increase the number of customers from 4304 to 5238 during the year—had proved that the right steps were adopted. With regard to the supply of electricity at the unremunerative rates referred to, the Company, having no vote, were helpless; and the ratepayers seemed inclined to permit their representatives to continue in this course. The sale of residuals during the year had been poor. A little more income had been received under this head; but it had not been in the shape of profit, because it had been necessary to reduce prices to get rid of the residuals, which were bulky, and expensive to keep in stock in large quantities. The sum received for residuals was only £8868. There was another competitor they had had to contend against the last few years, and that was Colonial coal, which had become very generally used, and which was a benefit to almost everybody except the Gas Company. It provided a cheap form of fuel for heating and cooking, which competed with gas; and the same remark applied to its use in steam-engines for generating electricity. Until lately, however, they had not been able to find any coal in the Colony suitable for gas making, and so had had to send all their supplies from this country. Some of their coal during the past year had been purchased at increased prices, and they had also carbonized a larger quantity, so that the cost had been nearly £3000 more. There was another item which was a serious expense to the Company. At present their population was of an extremely changeable character; and probably no gas company in this country suffered so severely from this cause. After much experience both as to leaving meters in houses and removing them, they had come to the conclusion that it was undesirable to leave meters for any length of time in premises which had been vacated. The cost of removing, storing, and replacing them was less than the risk of leaving them in empty houses. During the year, they disconnected 1464 meters; but they had not, of course, absolutely lost these customers, who possibly changed from one place to another. They had connected many more meters than they had disconnected; the increase in the number of consumers having been 934. For the past two or three years, the Cape Town Municipality had been trying to overcome some of the trouble caused by the dust in the roads by having wood and asphalte paving; and when these materials were used, it was more expensive to open the roads to get at the mains. Consequently, whenever the Company had received notice that a road was to be repaved in this manner, they had opened up the mains and services and carried out any necessary repairs. This had been expensive; but they hoped to derive benefit from it in the future. All this outlay was charged to revenue; and the Manager (Mr. E. P. Reilly) reported that the works were repaired and kept in good order in the same way. The reductions made in the price of gas in the last three years accounted for a loss of income of £11,030 per annum. Three years ago the price was reduced by allowing a discount; and then within the last year they had had to make a still further reduction beyond this. The reduction last year alone, he supposed, would work out to a little more than £7000 a year; but they were compelled to make it. Another competitor during the past few years had made great strides, and that was paraffin oil. Lamps with atmospheric burners had been introduced into the Colony; and now there were thousands of them used for cooking and heating, in addition to the oil-lamps with which incandescent mantles were employed. At the present time, in spite of all the facilities the Company offered, there were more people who used oil-lamps for cooking than who used gas. The Directors hoped to change this, but it would never have been possible had they not reduced the price. The reason they could not sell their residuals was that the industries that used to provide the Company with large customers for coke were now inactive. They had been searching for other outlets; and they had been fortunate in finding a new industry which used a little coke—that was fruit preserving. But cheap timber came in and competed with them, and had lessened the sale to some extent for this purpose. In 1901, the amount received for residuals was £21,612; in 1902, £23,625; in 1903, £25,828; in 1904, £18,000; and from that time the receipts had dropped, until in 1906 the figure was £8378. Last year they seemed to have turned the corner, as the sum was £8868; but this was a reduction of £17,000 from the prices they were able to obtain in 1903. Here were three items which showed where the loss of profit as compared with 1903 (which was their best year) came in. The lower receipts for residuals represented £17,000; the reduction in the price of gas, £11,000; and a higher tax, about £1000—a total loss of profit of £29,000. Fortunately they had, as a set-off, been able to save something in expenses in almost every department; and he had strong hopes that they would continue to do so. Notwithstanding all the difficulties, they still earned £11,000 profit in 1907, to meet the interest on the stocks on which they had to pay it. As to the accounts, there was nothing of special moment to mention. They had had again to pay something in respect of the explosion which occurred in 1905. All claims had been as far as possible dealt with as they arose; and last year there was only one serious one outstanding—that by the postal authorities, who asked a considerable sum. They had settled this jointly with the Municipality, who were also defendants; and they had now cleared off all the claims in connection with the occurrence. It would be seen that £1286 was charged in the accounts under this head. The cost of manufacture and distribution was £37,222, as against about £35,000; but the extra cost of coal more than accounted for this difference. The expenditure would have been £1000 more, had they not been able to save to this extent in working. In many other items there was also some saving shown. A short time ago, Mr. J. L. Chapman was engaged to go to Cape Town and examine the methods of manufacture, and advise as to the course to be pursued. He had given most valuable advice, which had helped the Company considerably. Owing to the reduction in price, the receipts from gas in 1907 were £4000 less than the year before; but, as already remarked, had they been able to sell the gas at the same price as in 1906, they would have received £7000 more. The increase in consumers had been almost entirely in the prepayment class. He was inclined to think that in the present year the Company would do better. By the end of January, they were in a position to make all the gas required at Woodstock (instead of at two works, as hitherto); and their saving from that time to the end of March had amounted to £600, in spite of the fact that they kept all the fires up at the other works, in case of need. These savings ought to continue; and the outlay on coal he also thought would be less. With regard to Colonial coal, he had said that they had hitherto been in the position of not getting any advantage from it, though other people did. They had made tests, without deriving any benefit; but he was pleased to say that recently they had had better results. They had found a coal suitable for making gas; and they believed the price would make it compare favourably as regarded value with English coal. No very big tests had yet been made, because of a difficulty in getting the coal from Natal. They hoped to gradually introduce the use of this Colonial coal for gas manufacturing purposes; and if they found that they could employ it permanently, they would make a distinct saving. At present they had to send out all their coal in large shiploads and store it; and it thereby lost some of its value. There were other directions also in which they had some hopes of making savings. Therefore he trusted that next year the Directors would have better accounts to present than on this occasion. He wished to express the regret the Directors felt at the death of their late colleague, Mr. C. S. Kelman. In conclusion, he moved the adoption of the report and accounts.

Mr. H. R. Savory seconded the motion; and a lengthy discussion followed.

Mr. S. B. Asser said he could not see how the reduction of 5 per cent. in price made the difference in rental which was shown.

Mr. James Randall asked whether the coal was bought delivered

at Cape Town, or whether it was purchased here and the Company paid the freight. If the latter, what was the freightage? With the greatest deference to the officials and auditors, he suggested that an independent person should verify the stocks in Cape Town, as regarded quantity and value. The capital per million cubic feet seemed to him very high, even for a gas company operating abroad. He urged the desirability of keeping down the slot-meter capital. Of course, with this system there was the advantage of getting ready money; but this benefit might be purchased at too high a cost. It was a matter that should be keenly looked into.

The CHAIRMAN, in reply, pointed out that the report said a reduction of "about" 5 per cent. had been made to ordinary consumers. But, as a matter of fact, the reduction to prepayment consumers was 20 per cent.; and the power consumers, who were being lost very fast, were given more—depending upon the quantity used. To large power consumers, they allowed as much as 40 per cent. Coal had always been bought f.o.b. this side; and the average cost for freight last year was 12s. 11d. per ton, though a lower figure had been arranged for the whole of this year. He did not see how the stores could be valued other than by their own officials. As to the capital, some years ago when the output was rapidly increasing preparations were made so as to cope with any business that offered; and if the consumption fortunately grew by 50 per cent. or more, they could deal with it at a much smaller proportionate expense than now. They had considered the question of prepayment consumers. The receipts from these consumers had gone up from £6000 odd to £13,000 odd, so that he thought they got from the 934 customers gained last year a sufficient return to pay. The price paid for gas through these meters was 10s. per 1000 cubic feet. This class of consumer was desirable, because they would remain with the Company; and a great advantage was that there were no bad debts. At one time the Company had to write off £5000 of bad debts in one year.

The report was then carried; and the retiring Director (Mr. C. W. Lilley) and the Auditors (Messrs. C. F. Kemp, Sons, and Co.) were re-appointed.

Mr. J. L. CHAPMAN, in proposing a vote of thanks to the Chairman, Directors, and officials, testified to the excellent manner in which the latter did their work amid very great difficulties.

The vote was accorded, and the proceedings terminated.

A LIGHTING DEADLOCK AT MALTON.

The Malton Urban District Council seem doomed to be almost continuously at variance with their lighting contractors. Three years ago, on the advent of the Northern Counties Electricity Company to Malton, the Council let the lighting of the town to them, in place of the Malton Gas Company, who had had the contract for very many years. The result of this departure was that the Gas Company had to take down their gas-lamps, standards, &c., from the streets, and the electricity people had to put up new ones, in order to carry out the three years' contract. This contract has now almost expired; and the Council have been advertising for tenders for another three years' lighting, with the result, as stated at a meeting of the Council last Wednesday, that not a single tender has been sent in. The Clerk reported, however, that Mr. Henry Tobey, the Manager of the Malton Gas Company, had sent a letter explaining their position in the matter. In this, Mr. Tobey pointed out that the Council's specifications were drawn up almost solely for lighting by electricity; and this precluded the Gas Company from tendering, because the Council were not prepared to find their own lamps, columns, &c. If the Council had done this, the Gas Company would have been glad to submit a tender for supplying gas and lighting and extinguishing the lamps of the town; and their price would have been about £320 per annum. Further, the light would have been about 33 per cent. more than was specified for in the electricity contract.

The whole position was considered by the Council; and the Clerk was directed to write the Northern Counties Electricity Company requesting them to "tender for the lighting of the town and district in the manner contemplated by clause 2 of an agreement entered into between the Council and the Company on Dec. 29, 1899," and a Sub-Committee were appointed to see this carried out. Under the clause referred to, the Electricity Company agreed to light the town at a cost 30 per cent. less than was then paid for gas lighting. So far, this has not been carried out; and the position promises interesting developments for the future—the Gas Company being firm in their determination never again to tender for the lighting if they are required to find the lamps, columns, &c.

Gas Explosion at Northallerton.—Some damage was caused to the Northallerton Savings Bank last Thursday by a gas explosion. A smell of gas had been detected the previous night; and the Gas Manager had been sent for. It was while the men from the gas-works were digging outside the premises that the explosion took place.

Barry Gas Undertaking.—The Barry Gas and Water Committee have authorized their new Manager (Mr. T. E. Franklin) to appoint a foreman for the gas-works. It was suggested at first that he should recommend to the Committee someone for the appointment; but Mr. Franklin said he had always been in the habit of appointing men. He told the Committee plainly before he came to Barry that he wanted a free hand; and he asked for it then. The provision of a testing laboratory to cost £50 was also sanctioned; and Mr. R. N. Aspinall was appointed to assist in this branch of the work. Mr. Franklin reported that the whole of the carbonizing plant was in a deplorable condition; and that the existing conditions would make it impossible to obtain the results he would have liked. They were, he said, bound to put some of the beds out of action immediately. He had written to them before he came there as Engineer, to get the retorts repaired; and three months had already gone. Subsequently tenders were considered for the work in connection with the retorts; and it was agreed to accept Messrs. Winstanley and Co.'s tender throughout.

MUNICIPAL AFFAIRS AT ROTHERHAM.

Comptroller's Annual Report.

The Borough Comptroller of Rotherham (Mr. C. H. Moss, J.P.), in his report to the Finance Committee on the year's working of the various departments to March 31, states that a year ago the hope was expressed that the future results would be better; and this hope was justifiable, as the figures presented now are more favourable. The results of the trading departments are very satisfactory, particularly those of the gas-works, electricity works, and tramways. The usual large loss is shown on the water-works; but this arises from the fact that the old works are practically unremunerative, while the heavy payments for the Langsett and Derwent water schemes have to be made.

The income of the Gas Department from sales of gas through ordinary meters was £20,274, as compared with £21,030 for the previous year. The fall in the amount is, of course, Mr. Moss remarks, accounted for by the reduction in the price of gas which was authorized by the Committee in the middle of the year; the reduced price having absorbed more money than the normal increase in consumption provided. The income from sales of gas through automatic meters, £13,512, shows an increase of nearly £500 on the previous year. The sales of residuals resulted in an improvement of £979 in the revenue. On the expenditure side of the account, the manufacturing charges represent an increased amount of £2284, principally in the item for coal, which rose considerably in price early last year. Repairs and renewals have absorbed about £400 more than the previous year; and the final result is that the gross manufacturing profit comes out at £16,926, as compared with £18,188 for 1906-7. After providing for loan charges, the net surplus for the year is £7431, as compared with £8474 in 1906-7. Deducting the usual contribution for the gas for public lighting, which amounts to £2338, there will be a net available sum to be dealt with by the Committee of £5092. It is very satisfactory to note that the leakage has fallen to 8·4 per cent., which shows that the expenditure by the Manager (Mr. J. S. Naylor) on renewals of mains has been effective. The average price of coal and cannel for the past year was 10s. 2·7d., as compared with 8s. 9·5d. for the previous year. Under all the circumstances, the results appear to him to be very satisfactory, and creditable to the management.

As regards the electricity works, the income from the sale of current in 1907-8 was larger than that of the previous year by £1999; the total units sold having been 1,698,174, and the receipts £13,108, representing 1·852d. per unit. The cost of generation, distribution, rates, and management expenses absorbed 0·88d. per unit, as compared with 0·87d. in the previous year. The additional cost of fuel accounts for the increase. The manufacturing profit for the year was £7214, as compared with £6315 for the previous year. After paying loan charges, the net surplus for the year is £3302. Out of this sum, £1960 falls to be deducted for depreciation and renewals account, leaving a net surplus of £1342 for the year. As the provision for renewals is, in Mr. Moss's opinion, ample, he does not see why the Committee should not appropriate the surplus in aid of the rates, if they think fit.

The income from domestic water-rents for 1907-8 was larger than that of the preceding year by £291; and the income from meter supplies was also £313 greater. The cost of maintenance of works rose to the extent of £298; and renewals of mains also cost £425 more than in 1906-7. The year's working resulted in a gross profit of £15,319; and after debiting the loan charges (including Langsett and Derwent), the final result is a deficit of £1070, which, added to the previous debit balance, makes up a sum of £4023 to be carried forward, against 1908-9. Mr. Moss thinks the results of next year's working should be slightly better, even after allowing for increased loan charges on the expected additional expenditure.

The Council in committee have decided to set apart out of the gas-works profits £2500 for the relief of the district rate, and £500 towards the water-works deficiency, and from the electric light undertaking £1400 for the relief of the district rate, and to levy a general district rate of 4s. in the pound and a poor rate of 5s. in the pound—these amounts being the same as last year.

GAS-WORKS PROGRESS AT WIGAN.

Local Government Board Inquiry.

An inquiry was held at Wigan last Wednesday, by Mr. F. H. Tulloch, on behalf of the Local Government Board, into an application by the Corporation for sanction to borrow sums amounting to £22,250 for the purposes of the gas undertaking. There were present Alderman Holmes (Chairman of the Gas Committee), Councillor Bradburn, Mr. J. Timmins (Gas Engineer), and Mr. H. Jevons (Town Clerk).

The Town Clerk explained that the population of the borough at the last census was 82,428; and the present estimated population was 91,345. The total population of the districts supplied by the Corporation with gas, according to the last census, was 123,817; and the area actually supplied was 14,169 acres. Then there were certain districts the Corporation had power to supply which were not as yet supplied. The rateable value of the borough was £347,357, and the assessable value £312,690. The outstanding debt on the gas-works, under the Gas Act, was £287,638. There was no limit to the amount that could be borrowed for gas purposes, subject to the sanction of the Local Government Board. The price of gas for lighting was 2s. 10d., and for all other purposes 2s. 1d. per 1000 cubic feet; and this was subject to 10 per cent. discount if payment was made within a month. If the consumption of gas was over 150,000 cubic feet per annum, the price was subject to 20 per cent. discount; and by special arrangement, one consumer who took over 5,000,000 feet a year had a further discount of 5 per cent. Under the heading of meters, the Corporation were overexpended at March 31 to the extent of £2767; and under the heading of mains and services, to the extent of £4651—giving a total of £7418. Since Jan. 31, 1904, roughly speaking, 14½ miles of mains had been

laid, and 5878 new services had been put in. The number of consumers in the same period had increased from 12,081 ordinary to 13,058, and from 3259 prepayment to 7484—showing a total increase in the number of consumers of 5202. The Inspector expressed surprise at the rate of increase; and Mr. Timmins explained that people leaving old houses for new ones generally required new services; while the services in the old houses did not always come into use at once. The Town Clerk (continuing) said that during the year ending March 31, 1904, 37,402 tons of coal were carbonized at the gas-works; and during the year ending March 31, 1908, 42,610 tons were carbonized—showing an increase of 5208 tons, or 13·9 per cent. During the year ending March, 1904, they manufactured 425,319,000 cubic feet of gas, and in the the twelve months ending March, 1908, 487,476,000 cubic feet; giving an increase of 62,157,000 cubic feet, equal to 14·61 per cent. The Inspector remarked that there were probably not many towns in England and Scotland where gas-works were so remunerative; and he asked how the town stood. Mr. Timmins said it came out very well, and better than 90 per cent. of the towns; while Alderman Holmes pointed out that in twenty years profits amounting to about £180,000 had been handed over in relief of the rates. He had been to no gas-works, in London or about the country, that were kept up to the same standard as Wigan's, either for order or cleanliness.

Turning to another subject, the Inspector asked if the work done on capital account was carried out by contract or by the Corporation workmen; and Mr. Timmins replied that it was done by both. The Inspector said the Local Government Board would not approve of this, as the policy of the Board was that the wages of Corporation workmen should not be paid out of borrowed money. The Town Clerk pointed out that when Mr. Timmins employed his regular men to carry out work on capital account, he had to substitute casual labour for the time being; so that to all intents and purposes he was employing special men to do the work. The Inspector said he was sorry to be so persistent; but his Board required that the ordinary men should be kept in their own places, and that extra men should be employed to do work for which money was borrowed. The policy of the Board in this matter was recent. Mr. Timmins remarked that the question was raised by the Local Government Board Inspector at the last inquiry, four years ago. The Town Clerk then read correspondence with the Local Government Board, after the inquiry in 1904, showing how the Board set apart certain portions of the loan for wages to the Corporation workmen. He asked the Town Clerk to get him a statement of the wages paid for the work already done, and an estimate of the wages that would be spent on the mains and services to be laid. Mr. Timmins said they never knew how many services they might have to lay within the next two or three years; and the Town Clerk suggested that the Inspector should have forwarded to him a statement of the work done out of the £10,000 spent, and the wages paid to the ordinary staff. The Inspector said the Gas Engineer had estimated that so much money would be spent on mains; and inasmuch as he could estimate this, he thought he would also be able to estimate the money to be spent on labour. The Town Clerk replied that it was quite possible, in view of what the Local Government Board were doing, the Gas Engineer might see fit to alter his policy. Mr. Timmins remarked that when their own staff were fully employed, they did engage contractors. The Inspector thought he had better put the position before the Local Government Board, who would probably write the Town Clerk; and in the meantime the Gas Engineer would keep a strict account. Mr. Timmins said no separate accounts had been kept of contract work and work done by the ordinary staff; but a statement would be made according to the Board's requirements. The Town Clerk suggested that the wages of the ordinary staff should be paid out of revenue. When the Local Government Board wrote him, he said, he would submit the matter to the Gas Committee.

METROPOLITAN WATER BOARD.

New Issue of "B" Stock.

A Special Meeting of the Board was held on Friday to consider an urgency report by the Finance Committee in regard to a further issue of stock. The Chairman of the Committee (Lord Welby) brought up the report, which set forth that money bills to the amount of £750,000 were issued on the 6th of November last; the sum realized thereby being £730,374 13s. 9d. As these bills were issued with a currency of six months, provision must be made to meet them when they fell due on the 6th inst.; and the Committee had come to the conclusion that the funds necessary for the purpose, together with other moneys required by the Board, should be raised by the issue of £1,500,000 of "B" stock. From the transfer of the water undertakings to the Board down to March 31 last, the Board had expended, on capital account, £3,065,083, to which must be added their estimated further capital expenditure by March 31, 1909—viz., £500,000—making a total of £3,565,083. Of this sum, £2,875,974 had been raised; £1,390,241 of it being the proceeds of £1,500,000 of "B" stock issued in October, 1904. The balance to be provided was £689,109, which, with £730,375, the amount required to repay the principal moneys raised by the issue of money bills, made the total required £1,419,484. The Committee had consulted the Bank of England authorities as to the proposed issue, and they were of opinion that it might be made by public tender; the Board fixing, in consultation with the Bank, a minimum price per £100 of stock, below which no tenders would be accepted. The Committee recommended that the Board should create further "B" stock to the amount of £1,500,000, to be issued at the minimum price of 90 per cent., to bear dividend at the rate of 3 per cent. per annum, payable half yearly on March 1 and Sept. 1; and that the stock should be redeemable at par after the expiration of thirty years from Sept. 1, 1904. After some discussion, the recommendations were agreed to.

The Charge for Water in the City.

The Chairman of the Board (Sir R. Melvill Beachcroft) has addressed to the Lord Mayor a letter with regard to "the feeling of hostility which is being so generally expressed in the City against the Water Board in relation to the new water charges." The Chairman points out that the Bill which the Board promoted last session, under the direction of Parliament, proposed that the discretion which the Water Companies enjoyed of differentiating the charges according to the particular circumstances of each case, should be retained in the hands of the Board. The Corporation of the City of London were not satisfied that such a discretion should be given, and requested that a special clause should be inserted in the Bill making it compulsory on the Board to charge the same for water in the City as the New River Company had charged in the past. The result was that, though the Board strongly urged that discretion should be given them to make differential charges, the Joint Committee to whom the Bill was referred unanimously decided to withhold it, and make it compulsory upon the Board to charge a uniform rate to all consumers under like circumstances. The Board, therefore, have no alternative but to comply with the terms which Parliament has thought fit to impose upon them; and they are accordingly compelled to make throughout their area a uniform charge for water used for domestic purposes. The Board, equally with the general public, are much in the dark as to the product of the new charges. It may bring about equilibrium, or it may not; and any deficiency would have to be made good out of the general rates, the City bearing its share in proportion to rateable value. In conclusion, the Chairman says: "With all deference, then, to your Lordship, and to those who naturally complain at what they conceive to be excessive charges, I would venture to ask that judgment on the Act of Parliament and on this Board may be suspended until, at all events, the financial position is ascertained."

MANCHESTER CORPORATION WATER SUPPLY.

Past Year's Progress—Estimates for 1908-9.

A Special Meeting of the Water Committee of the Manchester Corporation was held on Monday, the 27th ult., to consider their report for the year ending March 31, which will be presented to the Council at their next meeting. It contained the following information.

The amount of estimated available rates outstanding on the above-named date, out of a gross sum of £79,000, was £47 11s. 11d., and of rentals £81 2s. 6d., out of a gross sum of £279,000. During the year, 144,255 taps and other fittings were examined, and 138,611 approved and stamped; 920 meters also were tested. The water-fittings in 51,507 houses and other premises were inspected, and, in addition, 34,365 inspections were made for the purpose of detecting waste, and where necessary the fittings were repaired. Connections were made to 4855 additional houses and other premises by means of more than 5¼ miles of service-pipes, at an expense of £1686 13s. 5d. The demand for water continues to increase; the daily quantity supplied during the year averaging 38,337,116 gallons, as compared with 37,016,113 gallons in the previous twelve months.

The Longdendale works were efficiently maintained last year. The various large valves controlling the delivery of water from one reservoir to another were overhauled, and, as far as practicable, put into thorough order. The legal proceedings taken by the Corporation against the New Moss Colliery, Limited, in respect of the injury caused to the Audenshaw reservoirs and lands adjoining by coal workings, were concluded in the House of Lords on Feb. 28, when judgment was given dismissing the Company's appeal with costs, and upholding the decision of the Lords Justices of Appeal in favour of the Corporation. The Bill of the Corporation now before Parliament contains provisions authorizing the construction of works at Longdendale for enabling floods to be dealt with more satisfactorily in the future, as well as for rendering available the full storage capacity of the reservoirs.

The works at Thirlmere and on the line of aqueduct were maintained in a satisfactory condition. Contracts were placed for the supply of cast-iron pipes required for the third line. At various times during the year, the question of afforestation at the Thirlmere watershed was under the consideration of the Committee, in conjunction with an exhaustive report made by Professor Fisher, of the Oxford University. The services of a forester were also engaged, and arrangements are in progress for carrying out an improved system of planting in future years. Owing to the large increase in the assessment of the works at Thirlmere for rating purposes, steps are being taken to appeal.

The demand for hydraulic power is steadily extending, and early in the year it overtook the productive capacity of the two existing pumping-stations. The quantity of power water pumped into the hydraulic mains during the year was 237,469,700 gallons, an increase of 5,191,600 gallons over the quantity raised in 1906-7. Of the total quantity delivered into the mains, 97·4 per cent. was accounted for by the meters on the consumers' premises. The increase in the number of premises to which the supply was given during the year was 20, and in the number of machines connected to the supply 71. The total number of premises supplied with power is now 533; and the total number of machines is 2045. The length of mains laid is 22 miles 35 yards; 1892 yards having been laid during the past year. The erection of a new pumping-station is proceeding with due expedition, and it is expected that the building and the first instalment of plant will be completed and ready for use towards the end of the current year.

The estimated expenditure for the year just ended was £371,645; but the sum actually spent was £369,486. For the current year, the estimate of expenditure is £381,544. On the income side of the account, the Committee's estimate for last year was £367,100, which it was thought would be £4545 less than the expenditure; but the actual income was £384,754. The Committee anticipate that the income for the present year will be £397,400. The deficiency on revenue account to March 31, 1907, was £60,495, which, by the surplus for the year just ended (£15,268), has been reduced to £45,227. The estimated surplus for the current year is £15,856, which, if realized, will bring the deficiency down to £29,371. On capital account, the estimate for last year was £280,000, and the actual sum spent was £66,874. For the present year, the estimate is £300,000.

The Barrow Corporation Gas Department have renewed for a further period their contract for the sole supply of gas-cookers with the Richmond Gas Stove and Meter Company, Limited.

NEW WATER-WORKS FOR SELBY.

Opening Ceremony.

Last Thursday, the new water-works for Selby, which have been carried out under the joint supervision of Mr. Percy Griffith, M.Inst.C.E., of Westminster, and Mr. Bruce M'Gregor, Assoc.M.Inst.C.E., the Engineer and Surveyor to the Urban District Council, were opened by Mr. Mark Scott, J.P., the Chairman, in the presence of members of the Council, local clergy, and prominent townsmen. There was a fairly large gathering; but the attendance was materially affected by the unfavourable weather—rain falling heavily during the greater part of the day. For this reason, the formal ceremony of opening the door of the works was dispensed with.

On the arrival of Mr. Scott, who was accompanied by Lord Londesborough, Mr. Griffith said he had the pleasure of handing him, on behalf of Mr. Gray and himself, a silver key of the pump-house, bearing an inscription recording the handing over of the works to the Council by the Engineers. He mentioned that they had been in progress for many years; and the town had now a supply of water for, he hoped, an indefinite period. After paying a warm tribute to the interest which Mr. Scott had displayed in the work, Mr. Griffith proceeded to explain the pumping plant, mentioning that they had a practically unlimited supply of water on the site. Mr. Scott, in accepting the key, expressed the obligation of the Council to the Engineers, and invited Lord Londesborough to start the engine. His Lordship complied, amid cheers.

A move was afterwards made to the reservoir, where, the Vicar of Selby (the Rev. Maurice Parkin) having offered a prayer, Mr. Gray explained that they would have in the reservoir 3½ days' supply of water, which was very satisfactory; but more satisfactory still was the increased pressure which they would obtain. The old water-works gave them a pressure at Selby of 30 lbs. to the square inch, whereas with the new undertaking they would have 70 lbs.

It may be mentioned that arrangements have been made for commanding every part of the magnificent Abbey Church (which has been completely restored after the serious fire in October, 1906) by means of fire hydrants served from the new reservoir, the pressure available from which will enable jets of water to be thrown over the roof without the intervention of a fire-engine.

Mr. Scott then opened the valves, admitting the water into the mains. In doing so, he said he looked upon this act as the completion of a work they had had to fight for very hard—a work that was absolutely necessary; and it would prove a great boon to the town of Selby for many years to come. They had not legislated for themselves, but for the future; and it gave him pleasure to send down abundance and purity to Selby.

After inspecting the reservoir and plant (a description of which is given below), the company returned to Selby, where they were the guests at luncheon of Mr. Scott. Advantage was also taken of the occasion to present to him a handsome brass clock and candelabra, which had been subscribed for by friends, in recognition of his long public service for the town. Mr. Scott presided, and was supported by Lord Londesborough. In giving the toast of "The Health of the Earl of Londesborough," he reviewed the history of the water-works undertaking, and said the work now completed would last for generations, and would be adequate for Selby if its population were 60,000 or 100,000 instead of 9000. Lord Londesborough, in responding to the toast, proposed "Prosperity to Selby," associating with it the name of the Chairman, to whom he paid a warm tribute for his work for the town. Mr. Scott acknowledged the toast, and proposed "The Engineers," speaking highly of the able way in which they had carried out their duties. Mr. Griffith and Mr. Gray responded; each bearing testimony to the cordiality with which they had worked together. Lord Londesborough then asked Mr. Scott's acceptance of the clock and candelabra, saying that he did not know of anyone more worthy of receiving a testimonial from the people of Selby. Mr. Scott, speaking with much emotion, cordially thanked the donors for their gift.

Description of the Works.

Of all the public undertakings in Selby, none will, it is claimed, confer greater distinction or reflect greater honour on the Council and its Chairman than the scheme completed on Thursday. The site of the new works at Brayton Barff, which was purchased from the Earl of Londesborough, was adopted on the advice of the late Mr. C. E. de Rance and Professor Kendall, of the University of Leeds. The scheme was first considered by Parliament in 1902; but, owing to opposition, the Bill was rejected by the House of Lords. In the following year, however, the Council secured the services of Mr. Griffith, who, in conjunction with Mr. Gray, prepared the present scheme, and supported it in Parliament, who, in face of strenuous opposition from Leeds, gave their sanction to it in the session of 1904. The water is drawn from an area in which the new red sandstone (the Bunter pebble beds) outcrops on to the surface. This sandstone is noted for its permeable character and the excellence of the water obtained from it; and that drawn for the supply of Selby is stated to be not only remarkably pure, but also very soft. The supply being obtained by direct infiltration from the surface, it was necessary to prevent the possibility of contamination; and to this end the two borings are lined with tubes for a depth of 100 feet from the surface. In order, however, to secure ample provision for future requirements, the borings were carried to a total depth of 400 feet, and the pumps were fixed at a depth of 200 feet. The adoption of borings instead of wells, and the use of borehole pumps, secured the great advantage that the pumps can be lowered to any depth that may ultimately be necessary to command the required supply. For the present, the full supply of 32,000 gallons per hour can be obtained at a depth of about 80 feet from the surface; so that there is a reserve of 120 feet, which must be exhausted before the pumps will require to be lowered. And even then the borings provide a further 200 feet of depth, which can be relied upon to meet the maximum requirements of Selby for an indefinite period. The two borings are constructed at a distance of 40 feet apart; and the centres are indicated by two domes, which form a conspicuous feature of the engine-house roof. These domes have been provided to enable the pumps and pump-rods to be easily withdrawn for examination and repair. The borehole pumps have been specially designed so as to secure steady and economical working, and at the same time to be easily withdrawn and replaced. They are provided with tubular rods, 10 inches in diameter, jointed by a special device designed by the Engineers to facilitate removal and refixing, and fitted with a patent automatic adjustment of balance to compensate for the rise and fall of the water in the borings.

The engines are vertical triple-expansion (marine type) condensing engines, guaranteed by the makers to work with the utmost economy in steam (and coal) consumption. The success that has been attained in this direction is shown by the fact that in coal alone a saving of about £200 per annum will be obtained at the new works as compared with the old ones. Under the engines are the force-pumps, which lift the water from the measuring tanks under the engine-room floor to the new service reservoir on the summit of Brayton Barff. This reservoir has a capacity of 800,000 gallons, sufficient to enable pumping operations to be stopped for 14 hours out of the 24, and altogether on Sundays. It is divided for one half its depth into two compartments, to enable the floor to be cleaned in one compartment while the supply is maintained from the other. The outlet main is fitted with a "Venturi" meter, which will give a continuous record of the quantity of water supplied to the town, as well as the total supply during any given period. The main itself is 10 inches in diameter, and passes through the village of Brayton, and through Gowthorpe and the Market Place to Ousegate, where it is connected up to the distribution mains, and by these is provided with an outlet into the old tower tank. The pumping-station, which is of very suitable design, is a conspicuous object from almost any part of the neighbourhood. There is also a picturesque cottage provided for the attendant.

The total cost of the new works is £30,000. This may at first sight appear high; but it is pointed out, in the interesting illustrated *souvenir* of the opening from which the preceding particulars have been taken, that, owing to favourable tenders being obtained, the pumping machinery, which was originally designed as a single plant, has been duplicated, and the capacity of the reservoir enlarged, without exceeding the original estimate. The great feature of the new works is the liberal provision made for future requirements, the result of which must inevitably be that future capital outlay will be unnecessary for an unlimited period. The Contractors for the engine-house, reservoir, and cottage were Messrs. Parker and Sharp, of York; for the engines and pumping machinery, Messrs. James Watt and Co., of Birmingham; for the boilers and electric lighting plant, Messrs. Davey, Paxman, and Co., of Colchester; for the mains and fittings, the Stanton Iron Company, Limited, of Nottingham; and for the "Venturi" meter and water-level recorder, Mr. George Kent, of High Holborn, London.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The truth of the statement that business is usually approached through the pocket and not by way of the head was well exemplified by some remarks which were made at the Edinburgh Town Council this week. The business before the Council was consideration of the draft estimates for the year now current, which were submitted by Treasurer Harrison. He pointed out that the increased demands made upon him this year for money came mainly not from the Town Council, to which he was commissioned to preach economy, but from outside bodies—the Gas Commissioners, Water of Leith Purification Commissioners, and the District Lunacy Board—of which he was not a member, and in whose deliberations he had no voice, but whose demands he must meet, although he had no means of satisfying himself, or of giving his personal assurance to the public that the money was being well spent. There was something wrong in the laws regulating local government when it was possible for this to happen. Speaking of the subject as it was affected by the actings of the Gas Commission, he said that £2665 more was wanted because the price of gas was up. He asked that the estimates be reconsidered. He should like with all respect to suggest items for reconsideration to some of the other Commissioners. For instance, the Gas Commissioners had put up the price of gas; and he doubted whether they had any moral right to do so. The Commissioners wished to advertise their product, and they induced the Town Council, three years ago, to go in for incandescent gas for street lighting. The Council spent nearly £11,000 on the installation; spreading the cost over three years. The third instalment fell to be paid next year; and until it was paid, he objected to the price of gas going up. The Gas Commissioners wished to advertise, and offered gas under cost price; and the advertisement had paid the Gas Commissioners handsomely. Bailie Maxton said he could not allow the statement with reference to the Gas Commission to pass unnoticed. One reason for raising the price was that the price of coal had gone up. The Town Council had passed a resolution in which they deprecated the fact that the Gas Commissioners were supplying anything below cost; and the Commissioners had observed the strictures of the Council in this matter. At the same time, they were still offering the gas supply at less than cost price.

It is reported that an action in the Sheriff Court at Falkirk, at the instance of Mrs. Margaret Forbes, or Mackenzie, against the Corporation of Falkirk, to which I have previously referred, has been settled. The pursuer sued for £100 as compensation for damage done to her farm crops by noxious fumes which the defenders permitted to escape from their gas-works during the year 1906-07. There is another action against the Corporation, in which the damage is alleged to have been inflicted upon garden crops. The actions were intended to go to proof; and in this event there would have been evidence of considerable interest to gas-works owners. There is no announcement as to the other case, the proof in which may go on; but settlement of Mrs. Mackenzie's action points in the direction of the Corporation considering

it would be cheaper to pay a small sum—of course, without admitting liability—than to go into a costly litigation, even although the outcome of the litigation were to them the satisfaction of having settled the law upon the point for the whole of Scotland. The question of liability for fumes from gas-works is one which is too large to be left to the revenues of a small undertaking to cope with. In respect that it touches all, it is such that it should be taken up by a combination of owners; but there is, as yet, no organization, in Scotland at least, which could deal with it. The Edinburgh and Leith Gas Commissioners were threatened with proceedings upon the same subject. The complainers in that instance did not go on. Had they done so, it is probable that the Commissioners would have resisted, and a decision of some authority would have been obtained. I only remember one instance in which damages were awarded in respect of injury to crops by fumes. That was in an action by the late Lord Glencorse against the Clippens Oil Company, Limited. In that case the fumes were from shale-works, and included smoke, which there would not be in this case. The decision has, however, some bearing upon the question, and shows that it is not altogether a foregone conclusion that the owners of a gas-works would prevail if a claim were pressed.

A melancholy incident came to light at Alloa on Monday morning. A man named Cunningham, with his wife and seven children, entered upon the occupation of a one-roomed house in Candle Street on Saturday morning. At the time Corporation workmen were engaged in the laying of a new gas-main in the street. On Saturday forenoon they made a connection with the property in which the Cunninghams had come to reside. On Sunday there was a strong smell of coal or sewer gas, and some of the inmates were sick and vomiting at times. The smell, however, abated somewhat, and no complaint was made to the authorities. But on Monday morning two of the children, aged six and eight years respectively, were found dead in bed, and all the other members of the family felt unwell; two of the girls being so much so that they were taken to the hospital. It has not yet been discovered whether the escape was of coal or sewer gas.

Theft from Devonport Gas-Works.—A labourer named Robert Coombs, living at Plymouth, was charged at Devonport Police Court last Thursday with stealing lead value 2s. from the gas-works. Prisoner was employed by Messrs. Willey and Co., who are dismantling the retort-house at the works previous to its reconstruction. After leaving work, he was stopped by a policeman, who found wrapped in a pair of trousers which he was carrying under his arm a piece of lead weighing 24½ lbs. Prisoner's defence was that the lead was a perquisite, and that if he had not taken it away it would have been carted with the old sheeting from the roof and other refuse to the tip. Witnesses for the prosecution denied this, and said that the lead should have been left on the ground to be taken to the store. The Magistrates came to the conclusion that the prisoner was not a common thief, though he knew the lead was not a perquisite, and bound him over to be of good behaviour.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *May 2.*

The week opened quietly; but rain and warmer weather brought out renewed demand later for Home consumption for immediate delivery. It is not yet clear whether those who have contracts for May shipment to cover will wait developments; but a fair number of direct orders for immediate and near delivery have come forward, and at the close prices are a shade dearer at some points. Closing quotations are, consequently, £12 8s. 9d. per ton f.o.b. Hull, £12 10s. to £12 11s. 3d. per ton f.o.b. Liverpool, and £12 12s. 6d. per ton f.o.b. Leith. Though the price quoted for forward delivery is still £12 7s. 6d. per ton f.o.b. at the best ports, there is more disposition on the part of makers to effect sales; and it is understood that £12 5s. per ton has been accepted in some quarters.

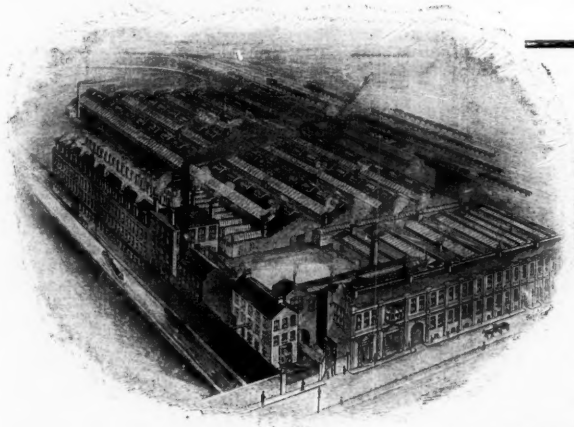
Nitrate of Soda.

This article is quiet. The quotations are 10s. 1½d. and 10s. 3d. per cwt. for 95 per cent. and refined qualities respectively.

Tar Products. LONDON, *May 4.*

The markets for tar products are quiet; and prices all round have a downward tendency. Pitch is unchanged. Business is possible on the east coast at 19s. per ton; while in London the best makes can be purchased at 20s. 6d. For forward delivery, it is possible to buy at 21s. for delivery to the end of the year. Continental consumers refuse to pay the equivalent to this figure; and, in fact, lower prices are reported to have been accepted for delivery all over 1909. There is no alteration in the market for 90 per cent. benzol; and it is stated that some quantity has been sold at 7¾d. for delivery to the end of the year. Benzol 50-90 per cent. is unaltered, and difficult of sale. Toluol is easy. There is some demand in the North; but only at low figures. In solvent naphtha, there is no alteration, and London makers quote 10d. for delivery to the end of the year; but it is reported that country makes can be secured for 9¾d. Creosote is decidedly dull. It is possible to buy in London at 2½d. without difficulty; while some quantity was, it is said, sold for immediate delivery at under this figure. In the North, prices remain unchanged; and, in Liverpool especially, there appears some difficulty in disposing of this article for near delivery. Carbolic acid is unaltered. Continental consumers refuse to pay more than 1s. 6d. per gallon on the east coast, and report having made considerable purchases at this figure. Some quantity, however, has been sold in the Midlands at better prices than these.

The average values during the week were: Tar, 11s. 9d. to 15s. 9d. *ex* works. Pitch, London, 20s. to 20s. 6d. f.o.b.; east coast, 19s. to 19s. 6d. f.o.b.; west coast, 19s. to 20s. f.a.s. Benzol, 90 per cent., casks included, London 8d. to 8¼d., North 7½d. to 7¾d.; 50-90 per cent., casks included, London 7¾d. to 8d., North 7¼d. to 7½d. Toluol, casks included, 8¼d. to 8½d.; North, 7¾d. to 8d. Crude naphtha, in bulk,



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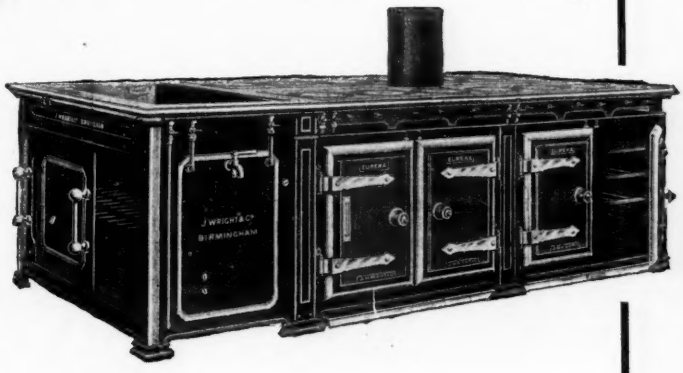

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Sulphate of Ammonia.

There is no alteration in the market for this article, and the position remains unchanged, though there is perhaps not quite such keen inquiry for prompt delivery as was the case a fortnight ago. Makers are very firm in their ideas; and it is generally believed that dealers will be compelled to purchase before very long to complete their May deliveries. The principal London Companies still quote £12 12s. 6d.; while outside makes can be secured at £12 7s. 6d. to £12 10s., Beckton terms. For forward delivery, £12 5s. is quoted for July-December shipment. In Hull, one or two best makes have been sold at £12 10s.; while the outside makes have been sold at £12 7s. 6d. to £12 8s. 9d. In Liverpool, £12 12s. 6d. is again reported to have been paid. At Leith, manufacturers ask £12 15s. for May delivery; but very little business has been done at this figure. For forward delivery, the Leith manufacturers ask £12 7s. 6d. July-December; but it is very doubtful whether they are securing this figure.

COAL TRADE REPORTS.

Lancashire Coal Trade.

There is no change to report in the coal trade of this county. Ample orders come in daily. Coalowners continue impervious to the offers of gas manufacturers for contracts at something below last year's increases. The slower demand for coal and coke for furnaces and steam purposes does not affect the general situation.

Northern Coal Trade.

There is a strong demand in the coal trade; and the commencement of the Baltic season will add to the activity. In the steam coal trade, the request is very full, more especially for best kinds; and some of the collieries have sold their output freely forward. Best Northumbrian steams are from 13s. 6d. to 13s. 9d. per ton f.o.b.; and for early delivery they are scarce. Second-class steams are 12s. 6d., and steam smalls are rather irregular at from 6s. 9d. to 7s. 6d. The work at the pits is full, and there is a strong inquiry for the production. In the gas coal trade, the demand for local consumption is moderate; but for export, it is above the average for this time of the year. Prices of Durham gas coal vary according to quality—from about 10s. 9d. to 11s. 6d. for the usual kinds, and from 12s. to 12s. 3d. per ton f.o.b. for "Wear specials." The large contracts for the London Companies may now be looked upon as practically completed. As far as can be judged, a larger portion of the contracts is this year given to Durham, though Yorkshire has again booked a part—it is said for over 150,000 tons. The bulk of the contracts, however, are settled for Durham coals, at prices from about 10s. to 10s. 9d. per ton f.o.b., according to the class. Some smaller contracts for other places are in treaty. Coke is steady; and gas coke is rather less plentiful. Good gas coke varies from 14s. to 14s. 9d. per ton f.o.b.

Scotch Coal Trade.

Trade for shipping is improving, as might be expected at this season. The home request is not so good. For export, ell is finding a ready outlet There is a quiet demand for steam coal for home purposes, particularly for the smaller varieties; this state of matters arising out of the troubles in the shipbuilding world. The prices quoted are: Ell 10s. 6d. to 11s. 6d. per ton f.o.b. Glasgow, splint 10s. 9d. to 11s., and steam 10s. 3d. to 10s. 6d. The shipments for the week amounted to 246,338 tons—a decrease of 71,840 tons (due to severe weather) upon the preceding week, but an increase of 7802 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,880.574 tons—a decrease of 362,883 tons upon the corresponding period of 1907.

Public Lighting of the City.

At the fortnightly meeting of the Court of Common Council of the City of London last Thursday, it was resolved, *nem. con.*, upon a report of the Streets Committee, that, with respect to the experimental electric lighting of Holborn, Farringdon Street, and Cannon Street, the offers from the City of London Electric Lighting Company and the Charing Cross, West End, and City Electricity Supply Company, Limited, to continue the experiments on the same terms for a further period of three months from March 31 last should be accepted. The Committee also reported that they had invited the City of London Electric Lighting Company, Limited, to submit a scheme of improved experimental lighting for Farringdon Street. Further, they submitted a report from the Electrical Engineer on the subject of public lighting; and stated that they had invited the City of London Electric Lighting Company and the Charing Cross, West End, and City Electricity Supply Company to make small side-street demonstrations of electric lighting, in accordance with suggestions contained in the report.

West Bromwich Gas Undertaking.—The sales of gas in connection with the West Bromwich undertaking during the financial year to March 31 were 342,064,000 cubic feet—an increase of 13,587,000 cubic feet over the previous year; and the amount of the gas-rental was £41,588—an increase of £1266. The Engineer (Mr. Harold E. Copp) being President of the Midland Association of Gas Managers, the Gas Committee have issued an invitation to the Association to visit the gas-works on the 29th inst., when they will also be entertained by the Committee.

THE

POSITIVE

PREPAYMENT METER

With Attachment Detached.

FITTED WITH

COLSON'S PATENT CASH-BOX

IF REQUIRED.

SAWER & PURVES

MILES PLATTING, MANCHESTER. RADFORD ROAD, NOTTINGHAM.

Scotch Representative: JNO. D. GIBSON, 93, Hope Street, GLASGOW.

A Compliment to Teignmouth Gas Management.

The Teignmouth Ratepayers' Association, at their last monthly meeting, took a somewhat unusual course in specially recognizing the success which has attended the recent management of the gas undertaking. Mr. G. Young, one of the members, stated that he had been informed that there was to be a reduction of 2d. per 1000 cubic feet in the price of gas. The members generally expressed gratification at this news, especially in view of the fact that there has been no recent increase in the price. It was decided that the Secretary should write to the District Council, and convey the opinions of the Association on the excellent management of the gas-works. The following letter was subsequently sent: "I am instructed to write you expressing the Association's high appreciation of the Council's gas undertaking and its management, with special reference to the gratifying fact that during the past winter, in spite of the greatly increased price of coal, your Council have (unlike neighbouring towns) supplied gas to the consumers without an advance in price being necessary—a fact that must be at least as gratifying to the Council as it is to the Ratepayers' Association and the consumers generally." When it is remembered that only a few years ago the management of the Teignmouth Gas-Works was a constant subject of criticism, and the financial position one of steadily accumulating deficit, this testimony to the improvement which has been effected must be very pleasing to those who are associated with the undertaking.

Suggestion for Checking Slot-Meter Robberies.

At the Old Street Police Court last Tuesday, before Mr. Cluer, George Parker, an elderly man, was charged with breaking open two gas-meters, the property of the Gaslight and Coke Company, at No. 21, Wimborne Street, and stealing the contents. Mr. Humphreys, who prosecuted on behalf of the Company, complained of the large number of these offences which had occurred throughout their district within the past few months; the loss to his clients being enormous. It was not represented so much by the innumerable small sums of money stolen from the boxes of the meters, as by the extensive and frequently wanton damage done to the fittings by the depredators. Mr. Cluer said he could sympathize very heartily with the Company, because his own personal experience had taught him that the loss in money and damage amounted to hundreds of pounds in the course of a year. He had, in fact, thought a great deal over the matter, in consequence of the frequency with which cases were brought before him; and he had formed the opinion that a considerable portion of the loss might be obviated by the Company getting a number of post-cards, having instructions printed upon them, and distributing them, stamped, among their consumers, with the request that, as soon as they decided to vacate premises where the meter or meters might be, they would post a card so that the Company might, if they chose, take the meters away as soon as the need of them ceased. Mr. Humphreys thanked his Worship for what he considered "a most admirable suggestion," and said he would convey it to the proper quarter. Referring to the prisoner, who had pleaded "Guilty," he said the house agent had expressly refused to allow him to have the key of 21, Wimborne Street, when he wished to "view the premises as a possible tenant;" his reason being that at several houses where Parker had gained admission on a similar excuse robberies from meters had been found soon after he had left. The accused had gained temporary possession of the key by a subterfuge. Mr. Cluer said it was a very fortunate thing that the records bore nothing against him previously, though there was very reasonable ground for suspecting that this was not the only time he had descended to such practices as those described for obtaining money. He would have to pay a fine of £3, or go to prison for a month.

A Complaint of Manchester Gas.—At the recent Easter vestry meeting of St. Thomas's Church, Ardwick, it was stated that the gas bill was larger than it had been for many years. Considerable expense had also been incurred during the past two years in providing mantles and other appliances; but notwithstanding this increased expenditure, the light in the church had become very bad. Complaints of the inferior gas now supplied in the city were universal. The poor suffered the most, as they were unable to supply the costly appliances which were used to secure the incandescent light. It was remarked that a profit of £50,000 had been made on the gas-works last year; but that this, instead of being a matter of boasting, was rather a reason for humiliation. This large sum of money had been wrongly taken from the ratepayers who were gas consumers. They had as a congregation to complain that they had had money taken from them which had been collected with difficulty for their church expenses; and, in addition to losing money, they had had constant annoyance of living in a state of gloom when they were in church.

Sir George Livesey on Workmen's Responsibilities in Preventing Accidents.—In accordance with the rules of the accident fund of the South Metropolitan Gas Company, an inquiry, under the presidency of Sir George Livesey, was held at the scene of the fatality at the East Greenwich Gas-Works; and a verdict was returned to the effect "that it was a pure accident, for which no defect in plant and no one was to blame." We learn from the current number of the "Co-partnership Journal" that prior to the inquiry Sir George addressed a large meeting of the men in the boiler-shop. He pointed out that everyone on the works had some measure of responsibility with regard to accidents; and he believed all recognized this, and were trying to prevent them happening. Their workmen were frequently asked to point out possible danger; and all in authority would welcome any suggestion. Anyone who saw anything that was dangerous and did not report it was blameable. Sir George added that a special request would be made to all employees to look for, and report, possibilities of accidents. They would then be submitted to a Committee composed of the Engineer and foremen, the members of the Co-partnership Committee of the station, and representative workmen from each department of the works, who would carefully consider all suggestions, and deal with them in the best possible manner.

CARRON

GAS COOKERS

After you have seen

The other Cooker

and studied the various Strong Points, have a look at

A CARRON

It means satisfaction to you and increased sales to us.

Carron Company
INCORPORATED BY ROYAL CHARTER 1773

WORKS: CARRON, STIRLINGSHIRE.

SHOW-ROOMS:—LONDON (City)—15, Upper Thames Street, E.C.; (West End)—23, Princes Street, Cavendish Square, W.; LIVERPOOL—22 to 30, Red Cross Street; GLASGOW—125, Buchanan Street; MANCHESTER—24, Brazennose Street; BRISTOL—10, Victoria Street; NEWCASTLE-ON-TYNE—13, Prudhoe Street; BIRMINGHAM—218, 220, 222, Corporation Street; DUBLIN—44, Grafton Street.

CARRON COMPANY · FOUNDED 1759 · INCORPORATED BY ROYAL CHARTER 1773

Gas Profits at Heywood.—The profit on the past year's operations at the Heywood Corporation Gas-Works amounts to £1358. A year ago, when the profit was over £1900, a sum of £1000 was taken for the relief of the rates. The Gas Committee, however, have on the present occasion decided to recommend to the Finance Committee that £800 be taken for this purpose, and the balance of £558 placed to reserve.

Appleby Gas-Works Results.—The report of the past year's working of the Appleby gas undertaking, which was submitted recently to the Town Council, showed that 5,641,077 cubic feet of gas had been made, and 5,758,910 cubic feet had been sent out. In other words, the department had sent out more gas than they had made. When this was pointed out, it was explained that it was probably the fault of the station meter.

Gas Profits in Aid of Rates.—In preparing their estimates for the year, the Finance Committee of the Bolton Corporation ask the Gas Committee to agree to a contribution of £20,000 from the profits of the department. In March, the Gas Committee decided that the amount to be anticipated by the Finance Committee out of gas profits in future should be equivalent to 2½ per cent. on £700,000, which was fixed as the value of the works.

Suicides by Gas at Bradford.—Simeon James, an out-of-work Bradford labourer, was discovered dead in bed last Wednesday; and the Coroner's Jury returned a verdict that he had committed suicide. A newspaper rolled up into a tube was fastened to a rubber pipe; and while one end was in his mouth, the other was attached to the gas-bracket, the tap of which was open. A second, and very similar, case was reported to the police on Thursday; a well-known spindle-maker named Arthur Smith having been found dead in a chair at his office. A length of rubber pipe connected his mouth with a gas-burner; the tap of which was turned on full.

Bombay Gas Company, Limited.—The report of the Directors of this Company for the year 1907 sets forth that there was considerable expansion in the sale of gas, both to private consumers and for the public lamps, in the period named. The revenue shows a total increase of £5227, of which £2590 was derived from private rental, £318 from the public lamps, and £2016 from residual products. Additional public lamps to the number of 47 were fixed; and the Municipality have decided to abolish the practice of extinguishing lamps on moonlight nights. The profit for the past year amounts to £15,303, making, with £3521 brought forward, £18,824. The interim dividend paid in December last absorbed £7200; and the Directors recommend a dividend of 3½ per cent., free of income-tax, making 6½ per cent. for the year, which will leave £3224 to be carried forward.

The Price of Gas in the Federated Potteries Towns.—We learn from local papers that the Provisional Order of the Local Government Board for the federation of the six Potteries towns into one county borough was received at the respective municipal offices last Thursday. It differs in details only from the Draft Order issued some time ago; the changes being chiefly verbal. The financial basis of federation remains the same. The most important alteration, perhaps, is with reference to the charge for gas. It is now provided that the price in the new borough is to be that which existed on Dec. 31, 1907, instead of on March 31 last. This gets over the resolutions passed by some of the Councils reducing the price of gas at the latter date. It may be remembered (see *ante*, p. 112) that the Longton Town Council declined to alter the price, on the Town Clerk's assurance being given that the Local Government Board would alter the date. It is considered possible that an arrangement might be come to for gas to be sold at a price just sufficient to cover expenses and loan charges.

Sale of Stocks and Shares.—At the Mart, Tokenhouse Yard, E.C., on Wednesday last, Mr. Alfred Richards (Messrs. A. & W. Richards) offered for sale some gas and water debenture and ordinary stocks and shares, including two new issues by order of Directors. The first of these consisted of £5500 of consolidated stock of the Uxbridge Gas Company, ranking equally with the existing similar stock for a standard dividend of 5 per cent., subject to the sliding-scale; this rate of dividend having been paid for the year ended the 21st of December last. It was all sold at from £96 to £100 per £100 of stock. The second issue was some £10 new ordinary 7 per cent. shares of the Ascot District Gas and Electricity Company. On similar shares, 5½ per cent. per annum has been paid; and those now issued were sold at par, *cum div.* as from the 15th inst. On the same occasion, some fully-paid £10 "B" shares in the Dorking Water Company, carrying £5 1s. 6d. per cent. per annum dividend, fetched £12 12s. 6d. each; a small parcel of consolidated "B" stock (7 per cent.) of the Croydon Gas Company, entitled to a dividend of 11½ per cent. per annum, was sold at from £235 to £236 per £100; and some 5 per cent. perpetual debenture stock of the same Company at £125 to £125 10s. per £100.

In the course of a Local Government Board inquiry regarding an application by the Brighouse Corporation for power to borrow £15,000 for gas-works purposes, the Town Clerk (Mr. James Parkinson) said that this total was made up of three separate sums. In the first place, they needed £6000 for working capital for the department; then they required £4000 to meet the expenditure on the gas cooking-stoves which they hired out; and they further wanted £5000 to meet the cost of the prepayment gas-meters they had had to provide in order to cope with the growing demand for this class of meter in the borough.

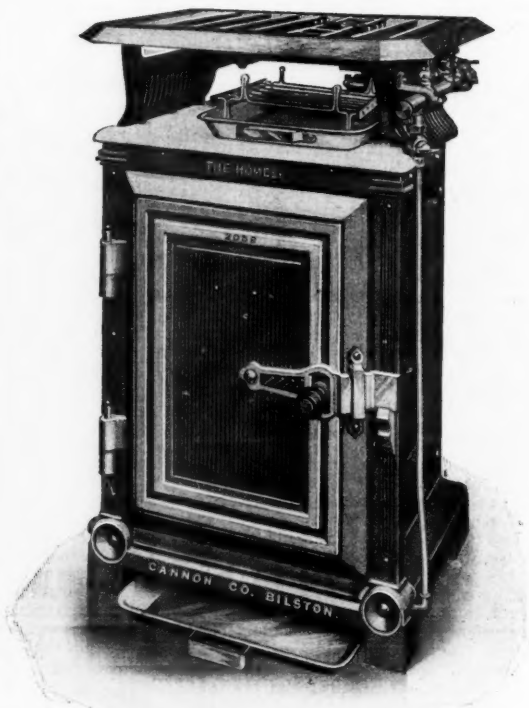
The Exeter Gas Company are making a very good display at the Trades Exhibition which is being held in the Victoria Hall in the city. The hall itself affords an excellent example of the effectiveness of modern gaslight. Last autumn the Company installed there a series of self-intensifying gas-lamps; and the lighting has since given general satisfaction. On the stall fitted up by the Company are a number of gas fires and cookers of various designs and sizes, and all the latest appliances for the economical and effective use of gas in the house and in connection with business. Prominent attention is called to the economy and efficiency of inverted incandescent burners; and the brilliant illumination of the stall is evidence of what can be done in the way of lighting by this means.

SLOT COOKERS

SURPRISING VALUE.

UP-TO-DATE IMPROVEMENTS.

NEW DESIGNS.



The "HOMELY."

All Gas Engineers should see this Cooker before ordering any other.

MAY WE SEND YOU A SAMPLE FOR INSPECTION?

ILLUSTRATED LISTS FREE ON APPLICATION.

Manufacturers:

CANNON IRON FOUNDRIES, Ld.,

DEEPFIELDS, near Bilston, Staffs., Eng.

London Office and Show-Rooms:

18, HOLBORN VIADUCT, E.C.

Australasian Agents:

JAMES HURLL & CO., Ltd., 20, Loftus Street, SYDNEY,

and Box No. 4 (G.P.O.) Dunedin.

The Bland Light Syndicate, Limited, has been registered with a capital of £20,000, in £1 shares, to acquire the business carried on by C. G. Davis, C. W. Bland, and E. W. Grimsdell, as Bland and Co.; to adopt an agreement with the Q.E.D. Syndicate, Limited; and to carry on the business of gas lighting engineers, &c.

The Laindon and District Gas and Water Company, Limited, held a very successful gas exhibition recently. Mr. Foulger, one of the largest landowners in the district, opened the exhibition, which was conducted by Messrs. Fletcher, Russell, and Co. Mrs. A. M. Collins, Gold and Silver Medallist, was the lecturer. The exhibition hall was lighted by gas throughout; and large and interested audiences attended each day.

Messrs. Alfred Richards and William Richards have decided to change the name of their firm from "Alfred Richards" to "A. & W. Richards," under which style they will continue to carry on business at No. 18, Finsbury Circus.

From an announcement which appears elsewhere, it will be seen that on the 15th inst. Mr. Edward Garvey will sell by auction at Grimsby £5000 of new ordinary stock of the Cleethorpes Gas Company, ranking for a standard dividend of 5 per cent. per annum, subject to the sliding-scale, under which, at the present price of gas, the authorized rate of dividend is 7⅜ per cent. per annum. The dividends on the Company's new stock, with which that about to be issued will rank, have risen steadily since 1905.

"ILLUMINATING TRUTHS."

LEAFLETS FOR DISTRIBUTION.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."
No. 7.—"The Osram Lamp: Fiction and Fact."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

AGENT (FIRE CEMENT). No. 4935.
WORKS MANAGER. Oldham Gas Department. Applications by May 12.
CHIEF METER INSPECTOR, &c. Cardiff Gaslight Company. Applications by May 29.
STOKER. No. 4939.

Situations Wanted.

CORRESPONDENT, TRAVELLER, &c., &c. D. P. Romans, Clapton Square, N.E.

Plant, &c. (Second-Hand), for Sale.

EXHAUSTER AND STEAM-ENGINE. Stafford Corporation.
STATION METER. Widnes Gas-Works.

Plant (Second-Hand) Wanted.

GASHOLDER. Lasswade Gas Company.

Licences to Work Under Patents.

INCANDESCENT MANTLE MACHINE. Haseltine, Lake, and Co., Southampton Buildings, Chancery Lane, W.C.
TUBES, &c. Lloyd Wise and Co., Lincoln Inn Fields, W.C.

Stocks and Shares.

BARKING GAS COMPANY. May 27.
BROMLEY GAS COMPANY. May 7.
CLEETHORPES GAS COMPANY. May 15.
EAST HULL GAS COMPANY. May 14.
FELIXSTOWE GASLIGHT COMPANY. May 12.
GREAT YARMOUTH WATER COMPANY. May 12.
HARROW AND STANMORE GAS COMPANY. May 21.
LOWESTOFT WATER AND GAS COMPANY. May 27.
MAIDENHEAD GAS COMPANY. May 27.
NORTHFLEET AND GREENHITHE GAS COMPANY. May 12.
PINNER GAS COMPANY. May 12.
SOUTH ESSEX WATER-WORKS COMPANY. May 12.
TENDRING HUNDRED WATER-WORKS COMPANY. May 27.

TENDERS FOR

Coal and Cannel.

ASCOT GAS AND ELECTRICITY COMPANY. Tenders by May 12.
BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 20.
BOGNOR GAS COMPANY. Tenders by May 13.
DARLINGTON GAS DEPARTMENT. Tenders by May 14.
GLASTONBURY GAS DEPARTMENT. Tenders by May 14.
GUILDFORD GASLIGHT COMPANY. Tenders by May 15.
LLYNVI VALLEY GAS COMPANY. Tenders by May 13.
NEWPORT (MON.) GAS COMPANY. Tenders by May 14.

Coal and Cannel—*continued.*

OMAGH GAS DEPARTMENT. Tenders by May 25.
SEVENOAKS GAS COMPANY. Tenders by May 13.
SHEPPY GAS COMPANY. Tenders by May 12.
WANDSWORTH AND PUTNEY GAS COMPANY. Tenders by May 4.
WOKINGHAM GAS DEPARTMENT. Tenders by May 12.

Naphthalene Trouble.

APPARATUS WANTED TO OVERCOME. No. 4935.

Oil for Gas Making.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by May 20.

Painting Gasholder.

DUKINFIELD GAS DEPARTMENT. Tenders by May 11.

Retort-Bench and Mountings.

WELLS URBAN DISTRICT COUNCIL. Tenders by May 2.

Roof (Iron).

SALISBURY GAS COMPANY. Tenders by May 15.

Tar and Liquor.

MACCLESFIELD GAS DEPARTMENT. Tenders by May 18.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 275.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
500,000	10	Apl. 10	10	**Alliance & Dublin 10 p.c.**	183½—19½	−1	5 2 7	551,000	Stk.	Feb. 27	10	Liverpool United A.	227—229	..	4 7 4
268,324	10	,,	7	Do. 7 p.c.	13—14	−½	5 0 0	718,100	,,	,,	7	Do. B	162—164	..	4 5 4
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	100—103	..	3 17 8	306,083	,,	Dec. 30	4	Do. Deb. Stk.	106—108	..	3 14 1
200,000	5	Oct. 30	6½†	**Bombay, Ltd.**	6½—6⅝	..	4 16 4	152,736	Stk.	Feb. 13	7⅜	Maidstone 5 p.c.	135—141	..	5 8 2
40,000	5	,,	6½†	Do. New, £4 paid	4½—5	..	5 4 0	75,000	5	Nov. 28	5	Malta & Medn., Ltd.	4¼—4⅜	..	5 5 3
50,000	10	Feb. 27	14	**Bourne-mouth Gas and Water** 10 p.c. / B 7 p.c. / Pref. 6 p.c.	27—28	..	5 0 0	560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	103—102	..	4 18 0
51,810	10	,,	7		16½—16⅝	..	4 3 7	250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	99—101	..	4 9 1
53,200	10	,,	6		14—15	..	4 0 0	541,920	20	Nov. 14	3½	Monte Video, Ltd.	10½—11½	..	6 1 9
380,000	Stk.	,,	12½	**Brentford Consolidated**	242—247	..	5 1 3	1,775,892	Stk.	Feb. 27	4⅜	Newc'tle & G'tesh'd Con.	106½—107½	+½	4 6 1
300,000	,,	,,	9⅜	Do. New	180—185	..	5 2 8	418,462	Stk.	Dec. 30	3⅜	Do. 3½ p.c. Deb.	83—91	+1	3 16 11
50,000	,,	,,	5	Do. 5 p.c. Pref.	118—123	..	4 1 4	15,000	10	Feb. 27	10	North Middlesex 10 p.c.	20—21	..	4 15 3
206,250	,,	Dec 13	4	Do. 4 p.c. Deb.	100—105	..	3 16 2	55,940	10	,,	7	Do. 7 p.c.	13½—14½	..	4 16 7
220,000	Stk.	Mch. 12	11½	**Brighton & Hove Orig.**	195—205	..	5 9 9	300,000	Stk.	Apl. 29	8	Oriental, Ltd.	140—143*	+1½	5 11 11
246,320	,,	,,	8½	Do. A. Ord. Stk.	152—157	..	5 5 1	60,000	5	Mch. 27	7	Ottoman, Ltd.	6—6⅜	..	5 7 8
460,000	20	Mch. 27	10	**British**	41⅜—42½	..	4 14 1	398,490	5	Apl. 29	7	Primitiva Ord.	6⅞—7⅛*	..	5 3 8
104,000	Stk.	Feb. 13	6	**Bromley, Ord. 5 p.c.**	116—119	..	5 0 10	796,980	5	Jan. 30	5	Do. 5 p.c. Pref.	4⅝—5⅛	..	4 15 3
165,700	,,	,,	4½	Do. do. 3½ p.c.	86—89	..	5 1 2	488,900	100	Dec. 2	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
500,000	10	Oct. 11	7	**Buenos Ayres (New) Ltd.**	11½—12	..	5 16 8	1,000,000	10	Apl. 29	8	River Plate Ord.	13¼—13⅜*	..	5 16 5
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	93—95	..	4 4 3	312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	Mch. 12	7½	**Cagliari, Ltd.**	25—26	..	5 11 6	250,000	10	Apl. 10	8	San Paulo, Ltd.	13½—14	..	5 14 4
100,000	10	—	—	**Cape Town & Dis., Ltd.**	4—6	..	—	125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	50—52	..	4 16 2
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	7—9	..	5 0 0	135,000	Stk.	Mch. 12	10	**Sheffield A**	244—246	..	4 1 4
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	46—45*	+1	6 5 0	209,984	,,	,,	10	Do. B	244—246	..	4 1 4
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92—94	..	4 15 9	523,500	,,	,,	10	Do. C	244—246	..	4 1 4
157,150	Stk.	Feb. 27	5	**Chester 5 p.c. Ord.**	105½—107½	..	4 13 0	70,000	10	Nov. 14	10	South African	14½—15½	..	6 9 0
1,493,280	Stk.	Mch. 12	5⅛	**Commercial 4 p.c Stk.**	104—109	..	4 15 5	6,429,895	Stk.	Feb. 13	4⅛	South Met., 4 p.c. Ord.	120—122	−1	4 7 4
500,000	,,	,,	5	Do. 3½ p.c. do.	103—105	..	4 15 3	1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	83—85	..	3 10 7
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5	209,820	Stk	Mch. 12	8	South Shields Con. Stk.	154—156	..	5 2 7
800,000	Stk.	,,	6⅔	**Continental Union, Ltd.**	115—120	..	5 8 4	605,000	Stk.	Feb. 27	5⅓	S'th Suburb'n Ord. 5 p.c.	116—119	..	4 9 7
270,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7	60,000	,,	,,	5	Do. 5 p.c. Pref.	118—121	..	4 2 8
460,170	Stk.	—	5½	**Derby Con. Stk.**	122—123	..	4 9 5	117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2	502,310	Stk.	Nov. 14	5	Southampton Ord.	107—112	..	4 9 3
148,995	,,	Mch. 31	5	**East Hull 5 p.c. Ord.**	100—103	..	4 17 1	120,000	Stk.	Feb. 27	6¾	**Tottenham and Edmonton** A 5 p.c. / B 3½ p.c. / 4 p.c. Deb.	120—125	..	5 8 0
486,090	10	Jan. 30	12	**European, Ltd.**	23—24	..	5 0 0	398,940	,,	,,	5¼		102—105	..	5 0 0
354,065	10	,,	12	Do. £7 10s. paid	16½—17½	..	5 2 10	149,470	,,	Dec. 13	4		59—102	..	3 18 5
15,182,590	Stk.	Feb. 13	4⅛	**Gas-light and Coke** 4 p.c. Ord. / 3½ p.c. max. / 4 p.c. Con. Pref. / 3 p.c. Con. Deb.	94—96	..	4 11 8	182,380	10	Dec. 30	8	Tuscan, Ltd.	10¼—10⅜	..	7 8 10
2,600,000	,,	,,	3⅜		87—90	..	3 17 9	149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
3,799,735	,,	,,	4		106—109	..	3 13 5	193,742	Stk.	Feb. 27	5	Tynemouth 5 p.c. max.	106—107	+½	4 13 6
4,193,975	,,	Dec. 13	3		83—85	..	3 10 7								
258,740	Stk.	Mch. 12	5	**Hastings & St. L. 3½ p.c.**	93—95	..	5 2 0	255,636	Stk.	Feb. 13	6½	**Wandsworth and Putney** B 3½ p.c. / 3 p.c. Deb. Stk.	128—133	..	4 17 9
82,500	,,	,,	6½	Do. do. 5 p.c.	112—115	..	5 13 1	80,075	,,	Dec. 30	3		73—78	..	3 16 11
70,000	10	Apl. 29	11	**Hongkong & China, Ltd.**	18½—19⅜*	..	5 12 10								
4,940,000	Stk.	Nov. 14	8	**Imperial Continental**	179—181	..	4 8 5	845,872	,,	Feb. 27	5⅜	West Ham 5 p.c. Ord.	99—102	..	5 0 6
473,600	Stk.	Feb. 13	3½	Do. 3½ p.c. Deb. Red.	93—95	..	3 13 8	185,000	,,	,,	5	Do. 5 p.c. Pref.	118—120	..	4 3 4
195,242	Stk.	Mch. 12	6	**Lea Bridge Ord. 5 p.c.**	113—118	..	5 1 8	228,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 14 9

† Next dividend will be at this rate. Prices marked * are "Ex div."

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."
United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in advance. If credit is taken, the charge is 25s. a year.
Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

FIDDES-ALDRIDGE
SIMULTANEOUS Discharging-Charger.
The one Machine which Discharges and Charges at One Stroke.
See Advertisement, April 28, p. III. of Centre.
ALDRIDGE AND RANKEN,
9, VICTORIA STREET, WESTMINSTER, S.W.
Telegrams: "MOTORPATHY, LONDON." Telephone: 5118 WESTMINSTER.

TO Gas Managers, &c., Wanted, Old Condemned GAS-METERS, from 1-light to 1000-light, for destruction to re-claim Metals. Write for Prices, Stating Quantities and Sizes, and if Wets or Drys. Scrap Metals, Drosses, Metal Shop Sweepings, &c., also bought
J. WILSON, Pleasant Grove, York Road, King's Cross, LONDON, N.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

OLD Gas-Works and Plant Dismantled by Competent Staff, and Best Prices Given for Old Materials.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

GAZINE—A radical Solvent and Pre- ventative of Naphthalene deposits, and the Automatic cleaning of Mains and Services.
It is also used for the Enrichment of Gas, and has an illuminating value double that of 90 per cent. Benzol.
Supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, WAKEFIELD, and SUNDERLAND.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 Hop, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

BENZOL
AND
CARBURINE FOR GAS ENRICHING.

ALSO
THE MAXIM PATENT CARBURETTOR.

For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD.,
7, BISHOPSGATE STREET WITHOUT,
LONDON, E.C.
Telegraphic Address: "Carburine, London."

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

THE KEITH LIGHT.
4800 INSTALLATIONS NOW IN USE.
SEE illustrated advertisement in next week's issue.
JAMES KEITH AND BLACKMAN CO., LTD., 27, Farringdon Avenue, LONDON, E.C.

PINCHBECK'S Meters and Burglar
PROOF STRONG BOX.
See illustrated advertisement, April 28, p. I. of Centre.
J. PINCHBECK & Co., Adams Place, George's Road, HOLLOWAY, N.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

INSURANCE—H. F. LAMSDEN. Insurance Broker (Established 1888), 19 & 21, Queen Victoria Street, London, E.C., quotes BOTTOM LONDON RATES FOR EMPLOYERS' LIABILITY UNDER THE NEW ACT. Collective Fidelity Guarantee and THIRD PARTY, INCLUDING DAMAGE CAUSED BY GAS EXPLOSION, Marine, Fire, and Loss of Profit in case of Fire. Motor-Car, Boilers, Engines, Lifts, Cranes, all classes of Machinery, and Plant. Payment of Trade Acceptances and Open Credits Guaranteed. Excess Bad Debt Policies fixed on the most favourable Terms.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

FRIEDRICH LUX.
LUDWIGSHAFEN-AM-RHEIN.
See Advertisement on p. 319.

BY adopting Cripps's Bye-Pass Valves inside your Purifiers, you can relieve the Back-Pressure in the Lower Tiers when the Purifying Material gets hard. They are extremely useful and economical.
Sole Makers: C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SHROPSHIRE.

BRISTOL RECORDING GAUGES AND THERMOMETERS.

J. W. & C. J. PHILLIPS, 23, COLLEGE HILL, LONDON, E.C., and 7, PARK SQUARE, LEEDS.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

AMMONIA.
Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

CORRESPONDENT, Traveller, Cashier Clerk of Works, Show-Room Assistant, or other EMPLOYMENT connected with Gas Trade wanted by Advertiser.
D. P. ROMANS, 3, Clapton Square, LONDON, N.E.

WANTED, Agent for Fire Cement.
One accustomed to Call on London and Provincial Gas and Railway Companies preferred.
Address No. 4935, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STOKER wanted for a 12-Million Works in Lancashire. Must be Total Abstainer, used to Engine and Exhauster, &c. Wages 26s. Summer, and 30s. Four Winter Months.
Apply, giving full Particulars, to No. 4939, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

THE Corporation of Oldham invite APPLICATIONS for the Position of WORKS MANAGER at their Hollinwood Gas Station.
The Annual Production at this Station is upwards of 600 Million Cubic Feet.
Previous Experience with Stoking Machinery, Regenerative Settings, and Water-Gas Plant desirable.
Commencing Salary £175, rising to £208, with House, Coal, Gas, Rates, &c.
List of duties may be obtained from the General Manager, Greaves Street, Oldham, to whom Applications and *copies* of Testimonials must be sent, endorsed "Branch Manager," not later than Tuesday, May 12, 1908.
J. H. HALLSWORTH,
Town Clerk.
Oldham, April 30, 1908.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

CARDIFF GASLIGHT AND COKE COMPANY.

THE Directors of this Company require the Services of a CHIEF METER INSPECTOR. He must be thoroughly conversant with the Requirements of Gas Consumers, and must be able to give Expert Advice and Estimates of Cost in regard to all Gas-Fitting Work, especially Installations of Incandescent Gas Lighting.

Salary, £175 per Annum.

Applications, marked "Chief Inspector," stating whether Married or Single, giving Previous Experience, and enclosing *copies* of Three recent Testimonials, to be forwarded to the undersigned not later than Friday, May 29 inst.

Particulars may be obtained from the undersigned.

Canvassing will disqualify.

By order,
GEORGE CLARRY,
Secretary.

Gas Offices, Cardiff,
May 2, 1908.

TO GAS ENGINEERS, &c.

APPARATUS Wanted to overcome Naphthalene trouble in a 30-Million Works.

Address No. 4936, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Second-Hand Gasholder. Capacity, 40,000 Cubic feet or thereabouts. Diameter, 40 feet. Telescoped preferred.

Particulars to the SECRETARY, Gas Company, LASSWADE.

FOR SALE—A 30,000 Cubic Feet per hour STATION METER, with 12-inch Valves and Connections Complete. All in Good Condition.

Plan and Particulars to be had on Application to the MANAGER, Gas-Works, WIDNES.

THE Corporation of Stafford have for SALE a Second-Hand, 20,000 to 25,000 Cubic Feet per hour Donkin EXHAUSTER, complete with VERTICAL STEAM-ENGINE of Marshall's make. The Exhauster was built in 1901, and can be seen running.

Further Particulars can be obtained from the undersigned.

HUBERT POOLEY,
Engineer and Manager.

Gas and Electricity Works,
Stafford, April 22, 1908.

WE have the following New and Over- hauled Second-Hand PLANT FOR SALE:—

Gasholder, 8500 cubic feet, New Steel Tank.
Gasholders, 35 ft. by 10 ft.
45 ft. by 14 ft.
50 ft. by 16 ft., Telescopic,
Overhauled and re-erected in new Steel Tanks.
9-inch and 10-inch Condensers.
Kirkham Washer.
Walker's Purifying Machine.
Exhausters and Engines, Single and Combined, 2000 to 60,000 feet per hour.
Scrubber, 7 ft. diameter, 55 ft. high.
Purifiers, sets 6-fts., 10-fts., 20-fts.
Plans and Quotations of new Sets.
6-inch to 18-inch Station Meters, Governors, &c. New Drums.
Tar and Liquor Pumps.
Producer-Gas Plants for 150 to 300 H.P.
All requisites for Gas-Works.

FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY (Yorks.).

BOGNOR GASLIGHT AND COKE COMPANY, LIMITED.

TENDERS FOR GAS COAL.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of their Requirements of GAS COAL for One or Two Years from the 1st of January, 1909, at the rate of 4000 to 5000 Tons per Annum delivered at Bognor Station (London, Brighton, and South Coast Railway) as required by the Company's Manager.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve the right to accept the whole or any part of the quantity offered.

Tenders to be sent to the undersigned not later than the 13th inst.

FRANK G. WATSON,
Secretary.

Gas Offices, Argyle Road,
Bognor, May 4, 1908.

NEWPORT (MON.) GAS COMPANY.

TENDERS FOR COAL.

THE Directors invite Tenders for the Supply of about 30,000 Tons of Best GAS COALS for Twelve Months commencing the 1st of July, 1908, to be delivered on the Company's Sidings at their Mill Street or Crindu Works in such quantities, and at such times, as may be directed by the Company's Engineer, from whom further Information may be obtained.

Tenders will be received for the whole or part of the above quantity.

Tenders, endorsed "Coals," to be delivered at the Offices of the Company not later than the 14th of May, 1908.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
T. H. HAZELL,
Secretary.

Newport (Mon.), May 1, 1908.

CORPORATION OF DARLINGTON.
(GAS-WORKS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas-Works Committee of the above Corporation invite TENDERS for the Supply of 39,000 Tons of Freshly-Wrought GAS COAL, delivered at the Gas-Works Siding, as required, during the ensuing Twelve Months.

Further Particulars and Form of Tender may be obtained from Mr. Frank P. Tarratt, Gas-Works Engineer, Darlington.

Tenders, endorsed "Tender for Gas Coal," to be delivered at my Office, Houndgate, Darlington, not later than May 14, 1908.

No pledge is given that the lowest or any Tender will be accepted.

H. G. STEAVENSON,
Town Clerk.

Town Clerk's Office, Darlington,
April 28, 1908.

BOROUGH OF BARROW-IN-FURNESS.

SUPPLY OF GAS OIL.

THE Corporation are prepared to re- ceive TENDERS for the Supply of about 650 to 750 Tons of OIL, suitable for the Manufacture of Carburetted Water Gas, delivered free at the Gas-Works Siding, in such quantities, and at such times, as may be required during the period ending the 30th of June, 1909.

Sealed Tenders, addressed to the "Chairman of the Gas and Water Committee," and endorsed "Tender for Oil," to be delivered at the Town Clerk's Office not later than Twelve o'clock noon on Wednesday, the 20th of May, 1908.

The lowest or any Tender not necessarily accepted.

By order,
L. HEWLETT,
Town Clerk.

Town Hall, Barrow-in-Furness.

SUPPLY OF COAL AND CANNEL.

THE Corporation are prepared to re- ceive TENDERS, on Forms to be obtained at the Office of the Gas and Water Manager, for the Supply of Screened GAS COAL and CANNEL for the Year ending the 30th of June, 1909.

Tenders, addressed to the "Chairman of the Gas and Water Committee," and endorsed "Tender for Coal," to be delivered at the Town Clerk's Office not later than Twelve o'clock noon on Wednesday, the 20th of May, 1908.

The lowest or any Tender not necessarily accepted.

By order,
L. HEWLETT,
Town Clerk.

Town Hall, Barrow-in-Furness.

GUILDFORD GASLIGHT AND COKE COMPANY.

COAL.

THE Directors of the above Company are prepared to receive TENDERS for the Supply of 12,000 Tons of DURHAM and SOUTH YORKSHIRE GAS COAL (Screened or Unscreened), to be delivered free at Guildford Station, between the 1st of July, 1908, and the 30th of June, 1909, in such quantities and at such times as required.

The Directors reserve the right to accept the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.

Tenders, to be endorsed "Tender for Coal," and to be sent to Ferdinand Smallpeice, Esq., J.P., Chairman of the Gas Company, on or before Ten a.m., on Friday, the 15th of May, 1908.

By order,
WILLIAM TITLEY,
Secretary.

Gas Offices, Guildford,
April 25, 1908.

BOROUGH OF MACCLESFIELD.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Gas Committee are prepared to re- ceive TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR made at their works during the Twelve Months commencing on the 1st day of June next.

Tenders for the Tar and Liquor separately to be sent in not later than Monday, the 18th of May, 1908, addressed to the Chairman of the Gas Committee, Town Hall, Macclesfield, and endorsed "Tender for Tar, &c."

For Conditions, apply to Mr. W. Newbigging, Engineer, Gas-Works, Macclesfield.

The Committee reserve to themselves the right of accepting any Tender for the Tar or the Liquor separately.

The highest or any Tender not necessarily accepted.

ARTHUR T. PATTINSON,
Town Clerk.

April 15, 1908.

LLYNVI VALLEY GAS COMPANY.

TENDERS are invited for the Supply of 2500 Tons (more or less) of GAS COAL, to be delivered in such quantities and at such periods as may be ordered between the 1st of July, 1908, and the 30th of June, 1909.

Tenders must give full Particulars, with Analysis, of the Coal proposed to be supplied, the same to be Fresh Wrought and free from all objectionable matter for Gas Making. Price to include delivery at the Gas-Works Siding, Maesteg (Great Western Railway).

Sealed Tenders, endorsed "Tender for Gas Coal," and addressed to the Chairman, to be received by the undersigned on or before the 13th of May, 1908.

The Directors have no Special Form of Tender, and do not bind themselves to accept the lowest or any Tender.

By order,
JAMES A. BOUCHER,
Manager and Secretary.

Maesteg, April 28, 1908.

DUKINFIELD CORPORATION.
(GAS-WORKS.)

TENDERS are required for the PAINTING of Two Gasholders. Particulars can be had from the Manager, W. Lindley.

Tenders to be addressed to the CHAIRMAN OF THE GAS COMMITTEE not later than Monday noon, May 11, 1908.

IRON ROOF.

THE Salisbury Gaslight and Coke Com- pany invite TENDERS for the Supply and Erection of an IRON ROOF.

Plans, &c., may be seen at the Gas-Works on or after the 6th inst.; and Tenders must be delivered to N. H. Humphrys, Manager, on or before the 15th inst.

The lowest or any Tender not necessarily accepted.

BOROUGH OF WOKINGHAM.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the Supply of 2000 Tons of SILKSTONE GAS COAL, Screened or Unscreened, to be delivered during One Year from the end of May next.

Sealed Tenders to be delivered at the Gas Office not later than Tuesday, May 12, 1908, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Coal."

The Committee do not bind themselves to accept the lowest or any Tender.

FRANCIS H. WOOD,
Manager.

Gas-Works, April 30, 1908.

RETORT AND BENCH MOUNTINGS.

THE Wells Urban District Council invite TENDERS for the Supply and Erection of BENCH MOUNTINGS and IRONWORK for a Setting of Five Retorts.

Particulars may be obtained of the Engineer, Mr. E. G. Smithard, Kings Lynn.

Tenders, endorsed "Ironwork," must be lodged with the undersigned on or before May 2, 1908.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
E. B. LOYNES,
Clerk.

Wells, Norfolk,
April 16, 1908.

GLASTONBURY CORPORATION.
(GAS DEPARTMENT.)

THE Glastonbury Corporation Gas Com- mittee are prepared to receive TENDERS for the whole or part of 2600 Tons of GAS COAL, Through and Through or Unscreened and Small or Slack, delivered at Glastonbury Station during the Year ending June 30, 1909.

Tenders to be sent in by May 14, 1908, addressed to Alderman John Morland, Chairman of the Gas Committee, endorsed "Tender for Gas Coal."

The Committee do not bind themselves to accept the lowest or any Tender.

D. E. GARLICK,
Manager and Secretary.

April 27, 1908.

SEVENOAKS GAS COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the Sevenoaks Gas Company invite TENDERS for 8000 Tons of GAS COAL (Durham or Yorkshire preferred) to be delivered at the Company's Siding (South Eastern and Chatham Railway), Sevenoaks, Kent, for Twelve Months ending May 31, 1909.

Tenders must be sent in by not later than Wednesday, the 13th day of May, 1908, addressed to the Chairman, W. Henry Cronk, Esq., 88, High Street, Sevenoaks.

Further Particulars may be obtained from the undersigned.

HENRY HOW,
Secretary.

Gas Offices, Sevenoaks,
April 27, 1908.

SHEPPY GAS COMPANY.

THE Directors invite Tenders for the Supply of about 10,000 Tons of Best Unscreened Durham GAS COAL, to be delivered in Barge free alongside the Company's Wharf at West Minster, in the Medway, during the Twelve Months next ensuing from the 1st of July, 1908, in monthly quantities as required.

Tenders, stating Price and giving full Description of the Coal offered, to be forwarded to the undersigned not later than Tuesday, the 12th of May next.

No Special Form of Tender supplied or required.

The Directors do not bind themselves to accept the lowest or any Tender.

By order,
H. BARBER,
Secretary and General Manager.

Gas Offices, Sheerness,
April 24, 1908.

ASCOT DISTRICT GAS AND ELECTRICITY COMPANY.

THE Directors invite Tenders for the Supply of about 4000 Tons of best DURHAM GAS COAL or SOUTH YORKSHIRE GAS COAL, to be delivered as and when required during the Twelve Months ending June 30, 1909, at the Gas Company's Siding, Sunninghill, Berks (London and South Western Railway).

Tenders, stating Price and giving Full Description of Coal offered, to be forwarded to the undersigned not later than Tuesday, the 12th of May, 1908.

No special Form of Tender is required or supplied; and the Directors will not bind themselves to accept the lowest or any Tender.

W. A. SCHULTZ,
Secretary.

Offices: 50, Cannon Street,
London, E.C.

OMAGH URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive TENDERS for the Supply and Delivery of 2000 Tons, more or less, of Best Screened GAS COAL, for delivery during the Year ending June 30, 1909.

The Council reserve to themselves the right to divide the Contract as they may think fit.

Tender Forms may be had on Application to the undersigned, to whom all Tenders are to be sent, endorsed "Coal," on or before May 25, 1908.

WM. M. DOWNIE,
Manager.

Gas Office, Omagh,
May 1, 1908.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

TENDERS FOR COAL.

THE Directors are prepared to receive TENDERS for the Supply of 80,000 Tons of Clean, Dry, Unscreened, Fresh-Wrought GAS COALS, delivered f.o.b. to the Company's Steamers at any suitable port during the Year ending the 31st of May, 1909.

The deliveries to be in about equal monthly quantities throughout the Year.

Payment in Cash Monthly.

Parties desiring to Tender for more than One Year must state separately the Price and Quantity offered for each Year.

Further Particulars may be obtained from the Engineer, Mr. H. O. Carr.

The Directors do not bind themselves to accept the lowest or any Tender.

Tenders, sealed and endorsed "Tender for Coals," to be addressed to the Chairman and delivered at the Company's Offices as under, not later than the 4th of May prox.

By order,
CHAS. W. BRAINE,
Secretary.

Fairfield Street, Wandsworth, S.W.,
April 7, 1908.

BROMLEY GAS CONSUMERS' COMPANY.

SALE BY AUCTION OF £5000 "A" ORDINARY STOCK.

THE Directors give Notice that they have Instructed

Messrs. BAXTER, PAYNE, and LEPPER

to SELL BY AUCTION, at the Royal Bell Hotel, Bromley, Kent, on Thursday, the 7th day of May, 1908, at Eight o'clock p.m. precisely,

£5000 "A" ORDINARY STOCK

of the Bromley Gas Consumers' Company in Lots of £100, £50, and £20 Stock. The Dividend on this Class of Capital since the Year 1898 has been at the rate of Six per cent. per Annum.

Particulars and Conditions of Sale may be obtained of the SECRETARY OF THE COMPANY, and of BAXTER, PAYNE, AND LEPPER, Auctioneers, Bromley and Beckenham, KENT; and 69, KING WILLIAM STREET, E.C.

By order of the Directors,
HENRY WILLIAM AMOS,
Secretary.

Offices; 156, High Street,
Bromley, Kent, April 16, 1908.

PINNER GAS COMPANY, LIMITED.

SALE BY TENDER OF 600 "B" SHARES OF £5 EACH.

MINIMUM PRICE, £7 15s. PER £5 SHARE.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER 600 "B" SHARES of £5 EACH, being a portion of the Additional Capital authorized by The Pinner Gas Order, 1901.

The Shares will be allotted to the highest Bidders; but no Tender will be accepted at a lower price than £7 15s. per £5 Share.

The Standard rate of the Dividend authorized for the "B" Shares was £7 per cent. per Annum; but since June, 1905, the Company has adopted a Sliding-Scale as to profits; and the Dividends for the two years ending the 30th of June, 1907, have, respectively, been £7 7s. and £7 17s. 6d. per cent. per Annum, and the Directors are convinced the Company will again be able to pay a Dividend on these Shares at the full Maximum rate of £7 17s. 6d. per cent. for the Current Year.

As from June next, the price of Gas will be further reduced to 3s. 11d. per 1000 cubic feet, which it is fully anticipated will enable the Company to pay a Dividend of £8 8s. per Cent. on these Shares for the year ending the 30th of June, 1909.

No Tender will be received after Twelve o'clock noon on Tuesday, the 12th day of May, 1908.

Particulars and Form of Tender can be obtained on Application to the Secretary.

By order,
WM. WMS. BOX,
Secretary.

28, Great James Street,
Bedford Row, London, W.C.,
April 13, 1908.

By order of the Directors of the

CLEETHORPES GAS COMPANY.

MR. EDWARD GARVEY will Sell by AUCTION, at the Yarborough Hotel, Grimsby, on Friday, the 15th of May, 1908, at 3.30 p.m. precisely, in Lots of £100 nominal value,

£5000 NEW ORDINARY STOCK

of the Cleethorpes Gas Company. This Stock, which is issued under the provisions of the Cleethorpes Gas Act, 1900, ranks for a Standard Dividend of £5 per cent. per Annum, subject to the Sliding-Scale, under which, at the present price of Gas, the authorized rate of Dividend is £7 7s. 6d. per cent. per Annum.

Particulars may be obtained of Mr. E. J. BROCKWAY, the Secretary, Gas Offices, CLEETHORPES; the AUCTIONEER; and of

Messrs. BATES AND MOUNTAIN,
Solicitors, Grimsby.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including in these Periodical Sales Gas and Water Stocks and Shares belonging to Private Owners, can be obtained on Application to MESSRS. A. & W. RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £5000 ORDINARY STOCK
AND
£2500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

FELIXSTOWE GASLIGHT COMPANY.

NEW ISSUE OF £3000 ADDITIONAL ORDINARY STOCK AND £2500 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

GREAT YARMOUTH WATER-WORKS COMPANY.

NEW ISSUE OF £3000 NEW ORDINARY STOCK
AND
£2000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 12, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

NORTHFLEET AND GREENHITHE GAS COMPANY, LIMITED.

NEW ISSUE OF £3000 ADDITIONAL ORDINARY "C" STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 12, at Two o'clock, in Lots.

In the same Sale will be included (by order of a private Owner), £200 OF 3½ PER CENT. ADDITIONAL PREFERENCE "B" STOCK.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

LOWESTOFT WATER AND GAS COMPANY.

NEW ISSUE OF 400 ADDITIONAL ORDINARY £10 SHARES AND £1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, May 27, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

BARKING GAS COMPANY.

NEW ISSUE OF 200 £10 ORDINARY SHARES
AND
400 £10 SIX PER CENT. PREFERENCE SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, May 27, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

TENDRING HUNDRED WATER-WORKS COMPANY

(Supplying Harwich, Parkeston, Dovercourt, Walton-on-Naze, Frinton-on-Sea, and other places).

NEW ISSUE OF 300 £10 "B" SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, May 27, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

MAIDENHEAD GAS COMPANY.

NEW ISSUE OF £5000 ADDITIONAL CONSOLIDATED ORDINARY STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, May 27, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 18, FINSBURY CIRCUS, E.C.

EAST HULL GAS COMPANY.

SALE BY TENDER OF £25,005 NEW FIVE PER CENT. ORDINARY STOCK.

THE Directors Offer For Sale by Tender the above amount of Stock, to be issued under the provisions of the East Hull Gas Act, 1906, and the various Acts incorporated therewith.

Since the year 1867, the Company have paid without intermission the Maximum Dividend allowed by Parliament.

The Dividend is Cumulative—*i.e.*, should the Profits of the Company in any one year be insufficient to pay the Maximum Dividend, the same may be made up out of the Reserve Fund, or out of Surplus Profits in any future year.

Any amount of Stock, being a multiple of £5, but not less than £20, may be applied for.

The Stock will be allotted to the highest Tenders; but no Tender will be considered at a lower Price than £105 per cent.

A Deposit of £10 per cent. on the nominal amount of the Stock applied for must accompany each Tender, and the allottees must pay the remainder of the Purchase Money on or before the 1st day of June 1908.

Last day for receipt of Tenders, Thursday, the 14th of May, 1908, at Ten a.m

Forms of Tender and Particulars of Sale can be obtained at the Local Branches of Messrs. BARCLAY AND COMPANY, LIMITED, Bankers; or from the Offices of the Company, after the 24th inst.

By order of the Board of Directors,
DAVID WOOD,
Secretary.

Offices: St. Mark Street,
Hull, April 14, 1908.

HARROW AND STANMORE GAS COMPANY.

BY ORDER OF THE DIRECTORS.

SALE OF 280 £10 "C" SHARES BY TENDER, BEARING A STANDARD DIVIDEND OF 7 PER CENT.

THESE Shares are receiving now 7 per Cent Dividend.

The Standard Price is 4s. per 1000 cubic feet.

The present price of Gas is 3s. 7d. per 1000 cubic feet.

The overplus from the Standard Dividends for the Year 1907, when the price was 3s. 9d. per 1000 cubic feet, was used to create a Reserve Fund.

The increase in the Sale of Gas for the Year ended Dec. 31, 1907, over the corresponding period of 1906 was 19,633,000 cubic feet = 15 per cent.

For the Quarter ended March 31, 1908, the increased Sale, as compared with the same Quarter of last Year, is 6,514,000 cubic feet = 15·72 per cent.

No Tender will be accepted at a lower Price than £14 per £10 Share, or for less than Five Shares.

Particulars and Forms of Tender will be forwarded on Application at the Company's Offices, the Gas-Works, Harrow, Middlesex.

All Tenders must be delivered by Twelve o'clock on Thursday, May 21.

By order,
JAMES L. CHAPMAN,
Secretary.

May 1, 1908.

THE Owner of the Patents No. 90 of 1906 (Tubes made of Spirally Wound and subsequently Soldered Metallic Strips and Process of Manufacturing the same), and No. 14,189 of 1906 (Machines for the Manufacture of Tubes from Metal Strips), wishes to negotiate with Manufacturers with the view of Granting LICENCES under them on reasonable Terms.

For Information, Apply to Messrs. LLOYD WISE AND CO., Chartered Patent Agents, 46, LINCOLN'S INN FIELDS, W.C.

THE Proprietor of Patents Nos. 83 of 1901 and 24,218 of 1901, for "IMPROVEMENTS RELATING TO MACHINES FOR THE MANUFACTURE OF INCANDESCENT GAS-MANTLES" and "IMPROVEMENTS RELATING TO MACHINES FOR THE MANUFACTURE OF MANTLES EMPLOYED IN INCANDESCENT LIGHTING," is desirous of entering into arrangements, by way of LICENCE and otherwise, on reasonable Terms, for the purpose of EXPLOITING the same and ensuring their full Development and Practical Working in this Country.

All Communications should be addressed in the first instance to HASELTINE, LAKE, AND COMPANY, Chartered Patent Agents and Consulting Engineers, 7 & 8, Southampton Buildings, Chancery Lane, LONDON, W.C.

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OF THE

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